



# **Seattle Urban Forest Assessment: Sustainability Matrix**

**Submitted to the Urban Forest Coalition,  
City of Seattle**

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# Seattle Urban Forest Assessment: Sustainability Matrix

## Executive Summary

### A. Introduction

The city of Seattle has become one of the national growth centers for technology, communications and international commerce. Seattle is consistently named one of the U.S. cities with the best quality of life. Within this dynamic, growing community is an asset that is often taken for granted and is in decline - the urban forest. Trees and forest systems contribute to the identity and vitality of the city. As Seattle continues to grow and its population density increases, there is a need to review and assess the sustainability of Seattle's urban forest.

Cascadia Consulting Group, together with associates from the University of Washington's College of Forest Resources, was contracted by the City of Seattle in May 2000 to develop an assessment of Seattle's urban forest resource. This assessment is the first of four phases of a strategic plan being developed for Seattle's urban forest.

The urban forest assessment involved developing a matrix of sustainability parameters based on James R. Clark's urban forest sustainability model<sup>1</sup>. Clark's model contains three broad categories: Vegetation Resource, Community Framework and Resource Management. Each category is further divided into sub-elements containing performance criteria and benchmarks. Clark's model was the starting point and as the assessment proceeded the model was fine-tuned to enhance its applicability to large municipalities, such as Seattle.

The resulting model, in matrix form, was used to evaluate the status and condition of Seattle's multiple urban forest programs. In addition, to place the information into a meaningful context, the assessment compares Seattle's urban forest situation with that of several other cities in the United States and Canada to explore the lessons from these communities and their possible application to Seattle.

Combined, this information provides a picture of Seattle's urban forestry program and indicates where the City is succeeding and where it needs to focus greater attention. This assessment represents a starting point from which Seattle can launch sustainable urban forest strategies.

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<sup>1</sup> James R. Clark, Nelda P. Matheny, Genni Cross and Victoria Wake (1997) A Model of Forest Sustainability. *Journal of Arboriculture* 23(1)

The matrix provides information in summary form. Further details and some discussion of the findings are provided in the appendices. The matrix includes references that guide the reader to a specific appendix and subsection of the appendix (e.g. I.A. for Appendix I Section A). Appendix I provides data on Vegetation Resources, Appendix II discusses issues related to the Community Framework and Appendix III three offers information on Resource Management and policies related to city trees. Finally, Appendix IV is an analysis of other cities' urban forest efforts and highlights lessons learned.

## **B. Procedures**

The team employed various procedures for collecting the information included in the matrix. This information reflects the activities and policies in effect as of January 2000. For the Vegetation Resource the team utilized a combination of sample re-inventorying, GIS measurement of the City's digitized database of 1999 aerial photos, and regression analysis to estimate the current state of Seattle's urban forest.

Information supporting the Community Framework and Resource Management was provided by the City or derived from discussions and interviews with a variety of sources including city council members, community organizations involved in tree planting and maintenance, grantees of tree programs run by the Department of Neighborhoods, and business associations. Summaries of these interviews and discussions are included at the conclusion of Appendix II.

Information about neighboring and peer cities was obtained through phone interviews with other city staff, from information available on city web sites and from research publications. As part of this process, the team developed a short survey form to interview urban forest leaders in other communities. Additional information was obtained from academic and professional reports, such as the American Forests' Urban Ecosystem Analysis Reports. It should be noted that it was not possible to conduct an in-depth survey of each city included in this report. Information included in the matrix may not thoroughly reflect all programs and elements in each city's urban forest programs. However, as much relevant information as possible was obtained to develop benchmarks by which to compare and analyze Seattle's level of program sustainability.

## **C. Major Findings**

### *Vegetation Resource*

The assessment found reasons for both optimism and concern. The quantity of forest vegetation is slightly greater than reported in earlier studies<sup>2</sup>. Seattle has approximately 139,000 street trees and 115,000 park trees in or near landscaped areas. Residential lots add at least another 250,00 to 400,000 trees. Estimates place the total canopy cover for Seattle at approximately 25% including parks and woodland areas. Coverage in

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<sup>2</sup> American Forests (1997) Urban Ecosystem Analysis of Seattle, Washington

residential areas is 15.5% (both street and off-street trees). This figure tracks favorably with the 13% coverage reported in a study by American Forests.

The City has generally good tree diversity in street trees, although many of these trees are small and make a limited contribution to tree canopy. Just under 50% of the street trees have a diameter of 5 inches or smaller. Many of these smaller trees are young and result from new plantings undertaken over the past several years. These small trees will require regular maintenance to reach maturity. Diversity within the City's street trees is also fairly good with 300 species of trees in the inventory although the tree tally of many species is quite small. Over 24% of the residential street trees are *Prunus* species and in the central business districts two species, sweetgum and Norway maple, make up 13.5% and 12.6% respectively. The majority of City-owned trees are found in natural areas and parks with red alder and big leaf maple the predominant species.

The number and value of trees managed by Seattle's Department of Parks and Recreation are approximately equal to those for the City's street trees. Woodland trees provide 6,830 acres (roughly 14% of Seattle's land mass.) of canopy cover in the city. Although Seattle's contiguous woodland now exists primarily in parks and along steep hillsides and ravines that are unsuitable for building, the woodland is dwindling. The major challenges for Seattle's woodlands is to increase conifer cover, avoid fragmentation and maintain and increase connectivity.

### *Community Framework*

Community and neighborhood involvement is an important element (particularly in tree planting efforts) in the City's parks and residential neighborhoods. Community groups access trees and funding from a variety of sources. The Departments of Neighborhoods Tree Fund Program budgets \$100,000 annually to provide trees to community organizations and groups of neighbors interested in planting trees. The City also provides matching grant funds for urban forest support. Grant recipients match funds with in-kind contributions and labor, adding significant resources to the City's urban forest program. Active organizations are many and include ReTree Ballard, TREEmendous Seattle, Friends of Interlaken, and Seattle Audubon and they motivate individuals and groups to work on control of invasive species, restoration projects, and tree planting in residential neighborhoods.

Both SEATLAN and City Light work extensively with community organizations to plant trees and conduct maintenance in neighborhoods and in parks throughout the City. SEATLAN manages its Tree Steward program in cooperation with Seattle City Light, Seattle Parks and TREEmendous. The program promotes volunteer activity, provides important motivation for dedicated individuals and helps the City obtain additional human resources. City Light also collaborates with communities in the implementation of its tree replacement program. Under this program City Light plants three trees for every one removed and much of this is achieved through its neighborhood connections.

The Parks Department also enjoys the support of volunteer efforts in its tree planting and management efforts. The Department's Adopt-a-Park and volunteer programs provide interested citizens with opportunities to participate in urban forest management and to learn about ecosystem management issues.

The current level of effort by community groups and individuals is impressive, yet the City could do more to increase the level of community participation through more effective outreach, city-wide volunteer training, and increased collaborative partnerships with existing volunteer programs. In addition to tree planting, the City could draw on this volunteer workforce to expand the maintenance and long-term care of the City's trees including offering pruning, mulching and tree care workshops throughout Seattle. To do this the neighborhood outreach program would need more staff and a more systematic approach to working with volunteers.

One lesson learned from other cities is the value of having many partners involved in support of urban forestry. Business, the green industry and civic leaders can both promote urban forestry and help leverage public funds to acquire additional resources. Most cities with successful urban forestry programs have an advisory council that considers urban forestry policy, assists with program implementation, and communicates the values and benefits of urban nature to the broader community. Seattle's urban forest coalition could expand to include community and private sector partners.

### *Resource Management*

One of the largest concerns voiced from community members is the apparent lack of unity and cohesion within the departments that manage the City's trees. This stems in part from the lack of a comprehensive urban forest management plan that would establish clear priorities for each department and clarify roles. Citizens also find it difficult to identify the appropriate contact person within the city for urban forestry-related questions.

The City currently spends an estimated \$2.3 million on tree management and maintenance in neighborhoods, parks and open spaces within the city (\$3.6 million if the costs of powerline clearance are included in the estimates). This level of funding appears to be insufficient to cover the costs of maintenance of existing trees in city parks, green spaces and on city streets. The insufficient funding has contributed to inability to control invasive species, prolonged pruning cycles for most trees (about 19 years for most street trees and none for parks) and inadequate public outreach and education, especially related to tree care on private property. This figure includes monies dedicated to tree management and maintenance to reduce the number of tree-caused electrical outages.

A national surveys of cities with populations greater than 100,000 indicates that Seattle lies between low per capita expenditure on trees (\$1.13) and high per capita expenditures (greater than \$18.00). Seattle's expenditure ranges between \$4.25 and \$6.60 depending if power line clearance costs are included. Minneapolis and Milwaukee have per capita expenditures that are more than double that of Seattle. Meeting the goals of increased canopy cover for the City may not require a doubling of expenditures, but will require

additional resources and more systematic approaches to applying those resources to urban forest management.

The City is moving forward with development of policies and guidelines aimed at tree protection and tree maintenance including the proposed PROPARKS levy, a Street Tree Ordinance, and Tree Protection Standards. These are important steps towards proactive management of trees that address public and private trees within the City. Passage of such measures will be a large step forward in clarifying the roles of the City and citizens in tree care and protection.

### *Conclusion - Urban Forest Vision and Value*

Urban forest systems contribute tremendous value to the City of Seattle. Seattle's asset basis is conservatively estimated at \$635 million. In addition, Seattle's trees increase assessed property valuation by up to \$630 million, thus boosting city property tax revenues to approximately \$131 million. Finally, trees provide ecological services. It is estimated that \$42 million is the estimated annual savings in air quality and storm water management remediation provided by existing trees.

This sustainability assessment is the first step in understanding the character and function of Seattle's urban forest. One key lesson that emerged from this assessment is that there must be a vision to guide ongoing efforts to make Seattle's urban forest vital and sustainable. Comprehensive planning and management is needed to protect and promote our green infrastructure for the value and benefit of future generations.

## Summary Matrix

### I. Vegetation Resource

(Note: Footnotes in matrix text refer to sections in Appendices I-IV)

Criteria	Objective	Current Seattle Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>A. Canopy Cover</b>	<i>Obtain climate appropriate city-wide coverage</i>	<p>Approximately 115,000 park trees in or near landscaped areas and 250,000-400,000 trees on residential lots.</p> <p>City-wide canopy 25%; 15.5% for residential areas <sup>I.A.</sup> American Forests reports reports residential cover of 13%. <sup>IV.B.</sup></p> <p>City-wide loss of high density canopy 1972-1996 is 48%; loss of medium density canopy in same time period is 67%. <sup>IV.B.</sup></p>	<p>Number of street trees increasing but many vacant planting strips. <sup>I.B.</sup></p> <p>Average distance between residential street trees is 152 feet. <sup>I.B.</sup></p> <p>American Forests study shows loss of forest types which provide most benefits. <sup>IV.B.</sup></p>	<p>Range of 10% to 34% <sup>IV.B.</sup></p> <p>Street tree counts 40,000 - 200,000. Incomplete data for canopy cover and private property cover. <sup>IV.F.</sup></p>	<p>Goal: to restore net residential canopy cover to 25%, 15% in CBDs <sup>IV.B.</sup></p> <p>Forest loss is a concern of forest managers in most U.S. cities. <sup>IV.D.</sup></p>
<b>B. Age/size distribution</b>	<i>Provide for and maintain uneven age distribution (size proxy)</i>	<p>City street trees are predominantly small and young - 49% of street trees are 5 inches in diameter or smaller <sup>I.B.</sup>. Only 14% are 12 inches or larger. <sup>I.B.</sup></p> <p>With increase of tree numbers and canopy areas diameter distributions indicate healthy pattern – planting of young trees while other mature for more canopy cover.</p> <p>Many park trees are mature, large and in a state of decline.</p>	<p>Increase protection of older, mature trees through tree protection policies and heritage tree program.</p> <p>Increase longevity of young trees through proactive care and regular maintenance.</p>	<p>In California (CA) aging trees results in 25% more trees removed than planted. <sup>IV.C.</sup></p>	<p>Seattle continues to plant new trees while population of larger tree class declines.</p>



Criteria	Objective	Current Seattle Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>C. Species Mix/Diversity</b>	<i>Ensure species mix and diversity</i>	<p>300 species of street trees in the City. <sup>LB</sup></p> <p>25% of residential street trees are Prunus. <sup>LB</sup></p> <p>In business districts, 28% are maple, 14% liquidambar. <sup>LB</sup></p>	Diversify species planted in business especially.		Seattle has good diversity of street trees.
<b>D. Native Vegetation</b>	<i>Preserve and manage regional biodiversity; maintain the biological integrity of remnant forests; maintain wildlife corridors</i>	10.7 square miles of woodland canopy (14% of Seattle land area), predominantly deciduous. <sup>LB</sup>	<p>Increase native conifer component.</p> <p>Significant challenge of removing invasive species.</p> <p>Avoid further fragmentation. Provide continuity by acquisition or easements.</p>		

## II. Community Framework

Criteria	Objective	Current Seattle Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>A. Awareness of and Commitment to Urban Forest Vision</b>	<i>Foster public/private understanding about trees as community resource, and the urban forest as a valuable resource</i>	<p>Total asset value of trees: \$635 million (\$145 million for street trees).<sup>1.B</sup></p> <p>Contributes up to \$630 million to real estate valuation.<sup>1.C</sup> \$42 million annual air quality &amp; storm water management benefits.<sup>IV.B</sup></p> <p>No communicated overarching vision for the City.<sup>II.B</sup> Current vision more internally focused-UFC</p> <p>Attention focused on planting without maintenance provisions.</p> <p>Information on Seattle's forest condition is not readily accessible to the public (although some information is available with access to web and intuition of where to look).<sup>II.B</sup></p> <p>Activists effective in ensuring land acquisition and green space/urban forest focus is in neighborhood comprehensive plans; forms the basis for PROPARKS levy proposal.</p>	<p>Reveal economic benefits of UF (air quality, storm water management).<sup>IV.B.</sup></p> <p>Develop a shared vision among departments and modified management systems to respond.</p> <p>Reveal the relationship of a healthy urban forest to a healthy urban ecosystem.</p> <p>Find ways to get the message out to citizens; insuring UF messages included in broader environmental themes that other agencies promote (e.g. natural lawn care, water conservation, habitat protection, etc.).</p> <p>PROPARKS provides stewardship funds as well as funds for acquisition and improvement. Requires voter support and approval.</p>	<p>Challenge of translating multiple tree benefits to economic returns.<sup>IV.C</sup></p> <p>Mayor sponsored programs and awards heighten awareness.<sup>IV.F</sup></p> <p>Strategic campaigns or "marketing" efforts serve to keep urban forestry in the public eye and promote partnerships.<sup>IV.F</sup></p>	<p>Frequent internal and external communications display UF progress, needs and forest conditions.<sup>IV.F</sup></p> <p>Mechanisms for fostering collaboration, coordination and outreach still in infancy stage and need greater development.</p>

Criteria	Objective	Current Seattle Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>B. Public Agency Cooperation</b>	<i>Insure all city departments operate with common goals and objectives</i>	<p>Formation of UFC illustrates inter-departmental commitment.</p> <p>No clear the chain of command regarding trees.<sup>II.B</sup></p> <p>Collaboration in outreach programs is still limited.</p> <p>No joint budgeting exercise for UF at city level to meet common program goals.<sup>III.B</sup></p>	<p>Set common objectives and delegate appropriate staffing and budget levels to insure efficient and cost-effective UF management across departments.</p> <p>Define leadership for UF in the City.</p>	<p>CA trend of consolidation of programs in Parks (from Public Works).<sup>IV.C</sup></p> <p>Most cities have an internal coalition to coordinate UF activities.<sup>IV.F.</sup></p>	<p>Successful peer cities have consolidated programs, often in parks.<sup>IV.F</sup></p>
<b>C. Policy Input and Development</b>	<i>Provide opportunities for citizens, government and business contribute to policy and programs of UF</i>	<p>Comprehensive planning process involved neighborhood input and PROPARK levy, if approved, will support UF activities.</p> <p>New ordinances under consideration for UF management; consultation on strategic plan; survey of voter attitudes will help inform policy and foster commitment.</p>	<p>PROPARKS levy, if approved, will provide additional resources for UF management and for maintenance; also provides for an Oversight Committee that could have sub-committee for UF issues as part of greater ecological focus.</p> <p>Establishment depends on voters.</p> <p>Trees versus views in city may provide challenges to UF policy.<sup>II.C.</sup></p> <p>Greater enforcement efforts required.</p>	<p>Most cities have urban forest commission, council or committee.<sup>IV.F</sup></p> <p>Advisory councils or committees provide policy input and initiate partnerships for public support and funding.<sup>IV.F</sup></p>	<p>Tree councils/committees are often sub-committees of more comprehensive city green advisory councils.<sup>IV.F</sup></p>

Criteria	Objective	Current Seattle Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>D. Regional Cooperation</b>	<i>Promote cooperation and interaction among neighboring communities and regional groups</i>	<p>Handful of regional groups.</p> <p>Very little corporate involvement <sup>II.C.</sup></p> <p>Coordination among communities occurs mostly related to community efforts in and around parks.</p> <p>City and communities tap federal, state and regional funding for UF.</p> <p>Washington DNR provides funds and urban forestry technical support.</p>	<p>Identify appropriate collaborators and substantive goals of cooperation. <sup>IV.F</sup></p> <p>More staff and support within the Tree Steward program could promote greater coordination among neighboring communities.</p>	Few cities specifically mention regional associations. <sup>IV.F</sup>	<p>Regional interaction can be initiated to address a specific issue, e.g. Portland's tree master plan will include salmon recovery <sup>IV.F</sup></p>
<b>E. Partners and Supporters</b>	<i>Build support for UF with major landholders, NGOs, corporations and green industry</i>	<p>Several NGOs closely involved with UF; good outreach to community organizations through Department of Neighborhood Funding Program. <sup>II.B</sup></p> <p>Limited involvement by corporations and business organizations. <sup>II.B</sup></p> <p>No clearly defined role for green industry involvement.</p>	<p>Build stronger support through Department of Neighborhood Funding especially for longer-term funding that would include maintenance and technical support.</p> <p>Building stronger linkages with business and BIAs in city; efforts may require recognition and special programs to entice business participation; requires investment in planning and programming.</p>	<p>Universities assist with research &amp; inventories. <sup>IV.F</sup></p> <p>Particular partners are attracted by publicized policy initiatives, e.g. Vancouver's Tree Trust <sup>IV.F</sup></p> <p>Some partners assist with program delivery, e.g. San Francisco's Friends of the Urban Forest <sup>IV.F</sup></p>	<p>Enlistment of partners and supporters by prominent city officials or civic leaders creates more high profile programs <sup>IV.F</sup></p> <p>Launching initiatives with catchy slogans, graphics and announcement of partnerships captures community attention. <sup>IV.F</sup></p>

Criteria	Objective	Current Seattle Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>F. Neighborhood Involvement</b>	<i>Insure UF issues and improvements are neighborhood interests</i>	<p>Neighborhood grants respond to neighborhood needs and desires.<sup>II.B.</sup></p> <p>Strong support for tree programs in neighborhoods and praise for city.<sup>II.B.</sup></p> <p>Comprehensive management plan involves neighborhoods and addresses needs.</p>	<p>Neighborhoods and volunteers can only do so much; require technical backstopping and equipment/inputs that must be accessible.<sup>II.C</sup></p> <p>Volunteer coordination at a central level may be required to ensure effective action; this requires staff resources.</p>	<p>Neighborhoods becoming locus of planting programs and services delivery.<sup>IV.F</sup></p> <p>Some cities with liaison staff to work directly with neighborhoods.<sup>IV.F</sup></p> <p>Neighborhood-based tree grants and training workshops common.<sup>IV.F</sup></p>	<p>Neighborhoods can be focus of program implementation and forest assessment, e.g. tree planting, pruning, inventory by neighborhood(s) units.<sup>IV.F</sup></p>
<b>G. Citizen/ Individual Involvement</b>	<i>Provide opportunities and resources for individual household actions</i>	<p>Individuals can access funding through neighborhood program through coordination with neighbors.</p> <p>Tree Steward program is highly praised by citizens and motivates individuals to plant and maintain trees.</p> <p>Outreach to individuals is limited, and limited feedback mechanisms in place for volunteers and individuals to inform management.</p> <p>Forest restoration programs in parks has strong public support from volunteer coordinators and program staff</p>	<p>Maintain motivation of individuals that can aid UF implementation.</p> <p>Develop a feedback mechanism for active individuals to inform decisions on policy and implementation.</p> <p>Individuals need greater access to information and have greater awareness.</p> <p>Maximize effectiveness of existing quality education materials to reach more citizens.</p> <p>Volunteer management requires staff and budgetary resources.</p>	<p>U.S. cities average. 2.4% of annual budget on citizen education.<sup>IV.D</sup></p> <p>Citizen information delivery methods include web sites, workshops, brochures, field days or Arbor Day/Week fairs, tree walks.<sup>IV.F</sup></p> <p>Most cities have volunteer coordinators to route requests and manage volunteer assignments.<sup>IV.F</sup></p>	<p>PNW cities spend higher % of budgets on citizen outreach than all other regions of country (8.6%).<sup>IV.D</sup></p>



### III. Resource Management

Criteria	Objective	Current Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>A. City-wide Management Plan</b>	<i>Develop objectives and implement a management plan for trees on public and private property</i>	No citywide management plan in place.	Require strategic vision and resources to develop UF management plan, review process, and update.	Several cities have management plans that are periodically reviewed and updated. <sup>IV.F</sup>	Adequate support for tree maintenance is concern of most UF managers in most U.S. cities <sup>IV.D</sup>  Internal operations plan can have public information component to heighten tree program visibility. <sup>IV.F</sup>
<b>B. UF Policy</b>	<i>Conserve/restore/enhance resources; develop guidelines and standards; ensure citizen safety and benefit</i>	UFC now in process of developing guidelines and approaches; requires political and budgetary support as well as program to educate voters.	Integrate tree conservation into land-use & growth mgmt planning. <sup>IV.B</sup>  Develop tools to increase tree cover in new development. <sup>IV.B</sup>  Enforcement of existing ordinances remains a problem as well as development of enforceable new laws.	CA cities' major challenges are planting/maintenance responsibilities and ownership. <sup>IV.C</sup>  Policy has both UF practices component (internal standards), and city quality component (external audiences). <sup>IV.F</sup>  Some cities policy re: tree stewardship (protection/preservation in development), emergency and storm management, tree valuation, or root protection - may or may not have code. <sup>IV.F</sup>	Tree policy is integrated with other citywide goals in Boston 400 and The Minneapolis Plan. <sup>IV.F</sup>

Criteria	Objective	Current Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>C. UF Practices</b>	<i>Protect existing trees; promote good species and site selection; provide standards for tree care</i>	<p>Limited public outreach on tree care or tree and site selection.</p> <p>Inadequate invasive species control.</p> <p>Pruning/maintenance cycle of 19 years on street trees. None on park trees.</p> <p>Good web site on tree species selection through web site and neighborhood program. Outreach to individuals and businesses less available.</p> <p>Support for maintenance weak in most programs.</p>	<p>Greater information accessibility and education required for species selection by homeowners and businesses.</p> <p>Adopt and fund acceptable cycles of maintenance.</p> <p>Cut pruning cycle in half.</p> <p>Much information is available but delivery mechanism still weak.</p> <p>Proposed PROPARKS levy would begin to address longer term funding for maintenance of existing tree resources and new plantings/acquisitions.</p>	<p>U.S. cities greater than 100K population have pruning cycle range of 3 to 40 years. <sup>IV.E</sup></p> <p>CA citizen/business selection of small canopy species are reducing potential long-term canopy benefits. <sup>IV.C</sup></p> <p>20% of CA cities use green waste for solid wood products. Also, many mulch green waste and distribute to citizens. <sup>IV.C</sup></p>	<p>Tree planting programs should include maintenance provisions; e.g. Minneapolis neighborhood grants are 5 year - 1 year planting, 4 year maintenance. <sup>IV.F</sup></p>

Criteria	Objective	Current Seattle Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>D. Funding</b>	<i>Develop and maintain adequate funding to implement city-wide mgmt plan</i>	<p>Insufficient funding for adequate staffing and maintenance activities.</p> <p>Seattle spends over \$6.60 per person on management of trees (this includes management by SEATRAN, Parks all City Light activities including power line related tree maintenance), or \$4.25 per person if the City Light power line maintenance is not included, but still faces challenge of funding shortfalls to meet long-term tree care and maintenance needs. <sup>III.B</sup></p> <p>Budgets are not coordinated; funding categories differ; expenditure tracking difficult. <sup>III.B</sup></p>	<p>Need cross-agency budget tallies to conduct adequate planning; develop priorities and submit proposals. <sup>IV.D</sup></p>	<p>Early 90s, U.S. 500K pop cities with 1.9M average annual budget &amp; \$2.60 per capita. <sup>IV.D</sup></p> <p>U.S. cities greater than 100K pop have range of \$1.13-\$18.70 expenditure per capita. <sup>IV.E,F</sup></p> <p>Increase in CA funding in 90s to about \$5 per capita. <sup>IV.C</sup></p> <p>Street tree management is largest expenditure in U.S. cities (average \$1.2 M). <sup>IV.D</sup></p>	<p>Need to identify and optimize alternative funding through partnerships and NGOs. <sup>IV.D</sup></p> <p>Cities developing multi-source funding to enhance and leverage public spending. <sup>IV.D</sup></p>
<b>D. Staffing</b>	<i>Employ/train adequate size of staff to implement city-wide mgmt plan</i>	<p>Too few staff for the job to meet the demand.</p> <p>Existing Tree Steward program is taxed.</p> <p>Loss of tree crew through I-695 caused severe strain in maintenance capabilities.</p>	<p>With staffing increases there is also a need for greater coordination in staffing.</p> <p>Systematic deployment of staff on maintenance rounds may increase efficiency.</p>	<p>&gt;90% of CA UF employees are professionally certified. <sup>IV.C</sup></p> <p>Most of the U.S. 500K pop. cities conduct training and safety programs, spending about \$15K annually. <sup>IV.D</sup></p> <p>Staff numbers for peer cities range from 9 to 200. <sup>IV.F</sup></p>	<p>Skilled work force makes more efficient and safe program. <sup>IV.D</sup></p>

Criteria	Objective	Current Seattle Conditions	Challenges and Opportunities	Other Cities	Lessons Learned
<b>E. Assessment Tools</b>	<i>Develop information methods to monitor the character and condition of UF on a continuing basis</i>	<p>Incomplete inventory of City trees.</p> <p>No comprehensive database to use for maintenance programming.</p> <p>Reported delays in adding new trees to the inventory database due to lack of personnel.</p> <p>Parks working on natural areas inventory and condition assessment with proposed additional funding in 2001.</p>	<p>Keep database up to date adding new plantings from variety of programs and conducting periodic assessments.</p> <p>Separate the inventories for public and private trees.</p>	<p>Most U.S. cities &gt; 100K pop have at least partial tree inventory in 2000, many using GIS platform. <sup>IV.E</sup></p> <p>Increased number of CA cities with inventories to improve planning. <sup>IV.C</sup></p> <p>Volunteers (when adequately trained) can assist with inventory data collection. <sup>V.F</sup></p>	Complete and up-to-date inventories maximize efficiencies of budgets and field activities. <sup>IV.D</sup>
<b>F. Regulations and Incentives</b>	<i>Establish a cohesive system of permitting, ordinances incentive programs and review procedures</i>	<p>Ordinance exists but enforcement lacking.</p> <p>New tree maintenance and protection ordinances under development. <sup>IIIB.</sup></p> <p>Parks permit process being updated.</p> <p>Tree protection standards currently being drafted.</p> <p>Heritage tree program in place but under-funded.</p> <p>No incentives other than grants to community groups exist to promote tree planting.</p>	<p>Enforcement as well as citizen knowledge of existing regulations and rules is limited.</p> <p>City interested in knowing citizen response to regulation of tree management on public and private land.</p> <p>Understanding of what incentives would work to promote UF management is limited at homeowner, business and other levels is limited.</p>	<p>CA ordinances with mixed effectiveness, tree planting with new development is effective to meet UF goals. <sup>IV.C</sup></p> <p>U.S. city tree codes span new/existing trees &amp; public/private property. <sup>IV.D</sup></p> <p>Most cities with planting specifications, species selection, public property tree removal codes. <sup>IV.F</sup></p>	Annual awards (mayor, tree council) increase UF visibility. <sup>IV.F</sup>

## **Appendix I. Seattle's Trees, Canopy Cover, and Tree Inventory**

### **A. Introduction**

Seattle has approximately 139,000 street trees, 115,000 park trees in or near landscaped areas, and at least another 250,000 to 400,000 trees on residential lots. In addition, the City has approximately 6,800 acres (10.67 sq mi) of woodland canopy, of which nearly half is in the City's park system. These trees provide an average canopy cover of 25 percent for the entire City (including woodland areas) and 15.5 percent for the City's residential areas and have a monetary value of at least \$635 million.

Estimates of numbers and canopy are based on 1) re-inventorying 52 sample "blocks" from the street-tree inventory initiated in 1990 (with "blocks" usually but not always rectangular city blocks), 2) the Department of Parks and Recreation Maintenance and Operations Management System Report of July 1986, and 3) GIS measurements using the City's digitized 1999 aerial photo coverage. Estimates of value use procedures developed by the Council of Tree and Landscape Appraisers for the International Society of Arboriculture. The "Procedures" section below explains how estimates were derived and is followed by an evaluation of Seattle's tree inventory records and capabilities.

### **B. Matrix Summary Details**

#### *B.1 Trees and Canopy Cover in Residential and Business/Commercial Areas*

Seattle has approximately 139,000 street trees and with a value of about \$146 million. Of these trees, an estimated 128,850 are in residential areas (up from about 81,000 in the City's street tree inventory) and 9,865 (up from 9,040) in the Central Business District and other commercial areas (CBDs). Note that most data for the street tree inventory were collected between 1990 and 1992 with most entries now eight to ten years old.

Average distance between street trees in the residential areas that have planting strips is 152 feet. The ideal distance would be 50 feet, which would allow for driveways and visibility setbacks from intersections. At least a doubling of street tree numbers would be desirable. For the downtown Seattle sample, the average spacing was 78 feet. (These average spacing values are for property frontage distances in which street intersections are excluded. Also, they do not apply to the approximately 15 percent of the City's blocks that have no planting strips.)

Street trees, however, contribute only a small percentage of the City's canopy cover, which is a better measure than tree numbers both for aesthetic value and for such utilitarian benefits as air cleansing, wildlife habitat, and reduced storm-water peaks and volumes. In residential areas, total canopy cover of street trees increased approximately 60 percent from the initial inventory to the present, with street trees now providing a canopy cover of 1.8 percent. For residential areas, however, off-street trees provide a canopy cover of 13.7 percent (7.6 times as much as street trees) for a total residential canopy cover of 15.5 percent. Because off-street trees in residential areas are generally much larger than street trees the nearly eight-fold difference in canopy cover is estimated to mean a two to three-fold difference in tree numbers, indicating somewhere between 250,000 and 400,000 off-street trees on residential lots.



American Forests, by sampling four residential blocks, one site in the City's industrial zone, and excluding trees in parks and greenbelts, estimated a canopy cover value of 13 percent. But, with rather confusing wording, this was called an "all-city" average. Interestingly, however, averaging canopy-cover values for the four residential blocks measured by American Forests gives the same value we found by measuring 34 blocks in residential areas, 15.5 percent

In CBDs (represented by re-sampling 18 blocks in downtown Seattle), the canopy provided by street trees increased 76 percent from the original inventory to the present. Street trees now provide a canopy cover of approximately 9.5 percent, with off-street trees in such settings as along hillsides, in plazas and landscaped business properties and Freeway Park adding perhaps another 3 percent for a total of 12.5 percent.

The average crown (canopy) area for a residential street tree was 309 square feet, equivalent to a crown diameter of 20 feet. And, in general, the off-street trees in residential areas are much larger than on-street trees. In the downtown Seattle sample, the average crown area for a street tree was 571 square feet, equivalent to a crown diameter of 27 feet.

Using reflectance "signatures" from August 28 1998 satellite data having 30- by 30-meter pixels, Joshua Greenberg examined the gradient of vegetative cover from Seattle's downtown core out to forested lands. His analysis depended on light reflected from sunlit vegetation, and many of downtown Seattle's trees were not detected because they were in the shade; on August 28 in Seattle, the sun's maximum angle above the horizon is only about 60 degrees. Thus Greenberg's estimate of 7 - 8 percent at the downtown end of the gradient, which was not intended as a precise measure of canopy cover, is not inconsistent with our on-the-ground estimate of 12.5 percent.

## *B.2 Park Trees*

The number and value of trees managed by Seattle's Department of Parks and Recreation are approximately equivalent to those for the City's street trees. The Department's 1986 Maintenance and Operations Management System Report listed about 106,600 trees with a value of \$145,312,000. These numbers do not account for park areas acquired since 1986, for new plantings, or for "edge trees" that are in the system's natural areas or greenbelts and also adjacent to private or commercial property. These trees generally require maintenance levels higher than typical park trees owing to their exposure and close proximity to streets and other urban conditions.

Since 1986 the park system has expanded from approximately 5,400 to 6,000 acres. Adjusting for new areas, new planting, and edge trees adjacent to private or commercial property gives an estimated 115,000 park trees requiring maintenance (not including the woodland trees discussed below) with a value of at least \$145 million. (See section C.3 for a derivation and discussion of tree values.)

### *B.3 Woodland Canopy*

The approximate area of Seattle's woodland tree canopy is 6,830 acres (10.67 square miles), 14 percent of Seattle's total land area of 84 square miles. Over 80 percent of this is in West Seattle and directly south of West Seattle, and nearly half of it is in the approximately 3,200 acres of Natural Areas in Seattle's park system. Note that woodland measurements emphasized area of canopy, rather than area of woodland. Note also that on September 30, 2000 the Seattle Urban Nature Project expects to release much more detailed data on these woodlands and other wildlife habitats in Seattle.

Most of the City's woodland canopy is provided by early successional hardwoods, primarily bigleaf maple and red alder, left from logging in the late nineteenth and early twentieth centuries. There are scattered conifers and very few stands of conifers. Although Seattle's contiguous woodland now exists primarily in parks and along steep hillsides and ravines that are unsuitable for building, it is still dwindling. American Forests noted that the area with "high-density" tree cover (>50 percent) decreased by 48 percent between 1972 and 1996. Also, although no on-the-ground sampling was undertaken, many of these woodland areas are heavily infested with such invasive species as Himalayan blackberries, English ivy, and Scotch broom, especially when in small or narrow patches that provide substantial entry of light from the side. In a study of its Duwamish greenbelts, the Seattle Department of Parks and Recreation found 40 percent of its sample sites to have Himalayan blackberry covering at least 25 percent of the area.

The major challenges for Seattle's woodlands are to increase the conifer component of these areas, to avoid further fragmentation, and to maintain and increase connectivity. Given the long head start enjoyed by the maples, alders, and other deciduous species, underplanting will generally need to be of such shade-tolerant species as western red-cedar and western hemlock, at times when there is an opening up of the existing canopy, and accompanied by control of invasive species.

Although restoring the old-growth conditions needed by many specialized species is too much to expect in a rapidly-growing metropolitan region, Seattle's woodlands can nevertheless provide good habitat for many species. Given enormous growth pressures and housing demands, avoiding further fragmentation and increasing the connectivity between patches of woodland will most likely require acquisition of key tracts, either in fee simple or by easements.

### *B.4 Age/Size Distribution*

The distribution of street trees by diameter classes (a proxy for age, which is generally not documented) has changed only slightly since the original inventory, especially for residential areas.

For residential areas:

<b>Diameter classes</b>	<b>0 - 5"</b>	<b>6 - 12"</b>	<b>13 - 20"</b>	<b>21 - 30"</b>	<b>&gt;30"</b>
Original inventory	47.2%	36.8%	10.4%	4.0%	1.6%
Current sampling	49.9%	37.4%	10.4%	2.0%	1.3%

For CBDs (sampled only in Seattle's downtown core):

<b>Diameter classes</b>	<b>0 - 5"</b>	<b>6 - 12"</b>	<b>13 - 20"</b>	<b>21 - 30"</b>	<b>&gt;30"</b>
Original inventory	36.8%	52.7%	8.2%	1.1%	.3%
Current sampling	20.7%	63.1%	15.5%	.7%	0.0%

Read in conjunction with the substantial increase in tree numbers and canopy areas, these diameter distributions indicate a healthy pattern--continued planting of young trees with existing trees moving into larger sizes and providing more canopy and benefits. Although tree numbers in the largest diameter classes have decreased, their canopy has been more than replaced by planting and the growth of trees in smaller diameter classes. Especially in sidewalk cuts in business districts, street trees larger than 30 inches in diameter usually are not suitable.

### *B.5 Species Diversity*

Generally, Seattle has good diversity in its street tree species but unnaturally low diversity in its greenbelts. No data were found or collected for diversity in park areas with developed landscapes, but diversity ranges from low in sites that are primarily in hardwoods left after logging to very high in the Washington Park Arboretum which has species from all over the world.

Blessed with a climate congenial to many species, the City has 316 "species" in its street-tree inventory. (Some of these are cultivars of the same wild species, and a few are shrubs rather than trees.) Because insects and diseases readily adapt to exploiting large groupings of genetically similar trees, a widespread recommendation is to have no more than 10 percent of trees in any one species and to avoid large numbers of genetically identical clones.

With several exceptions, Seattle's street trees are generally well distributed among species. In residential areas 24.6 percent of trees are of the genus *Prunus* (stone fruits like plums, cherries, and peaches). Although this is a very large and diverse genus, two varieties of purple-leaf plums comprise 11.2 percent of residential street trees.

For CBDs, sweetgum (liquidambar) accounts for 13.5 percent of street trees, followed by Norway maple at 12.6 percent. Both numbers are higher than desirable, and future plantings should emphasize other species.

As mentioned above, most of Seattle's woodland areas have very few coniferous trees. But, even though the "pre-settlement" old-growth forests of the region had relatively few species of trees, "diversity" for the City's remaining woodlands should be interpreted to mean increasing conifer species closer to levels that once predominated.

## **C. Procedures**

### *C.1 Estimating Street Tree Numbers*

A combination of sample re-inventorying and regression analysis was used to estimate the current state of Seattle's street trees. The Seattle City Light Department provided a CD with the City's 91,526-record street tree inventory, which was imported into a dBase format for various analyses and summaries.

An initial effort to increase sampling efficiency by stratifying Seattle into homogeneous units (by examination of enlarged aerial photos) was not very useful. Urban patterns of tree cover are wildly variable, even within small areas. Fortunately, data were easy to organize by "blocks," and there are strong correlations between (1) the number of trees and basal area per block in the original inventory and (2) the number of trees, basal area, and crown area that are there now. So, instead of within geographic strata, sampling was along the gradient of trees per block, from 0 to 124, with 34 residential blocks and 18 downtown blocks sampled, the latter used to represent all CBDs.

Regressions were then run to develop prediction equations for the desired values. The R-square values for these equations were generally 0.80 or higher (Fig. B - 1). (An R-square value of 0.80 indicates that 80 percent of the variance in a data set is explained.)

These equations were then programmed into computer routines that applied them to all blocks in the inventory. Although estimates for any one block are not precise, errors tend to compensate so that aggregate estimates for many blocks are quite good.

A slight awkwardness in this procedure was that many blocks had no street trees during the initial inventory and thus did not show up in a summary of inventoried blocks but nevertheless now had trees. The regression equations, however, predict current values for blocks originally having no trees (Fig. B - 1), and a few such blocks were purposely included in the data sets on which regressions were based. Thus adjustments were made for blocks omitted during the original inventory.

### *C.2 Estimating Canopy Cover*

To convert street tree diameters to canopy areas, both trunk diameter and crown radius were measured for 258 trees (far more than needed) of different sizes and species during the sample re-inventory, providing a data set used to derive a regression equation that converts diameters to canopy areas. As for other conversions, the canopy areas computed

## Old Basal Area Line Fit Plot

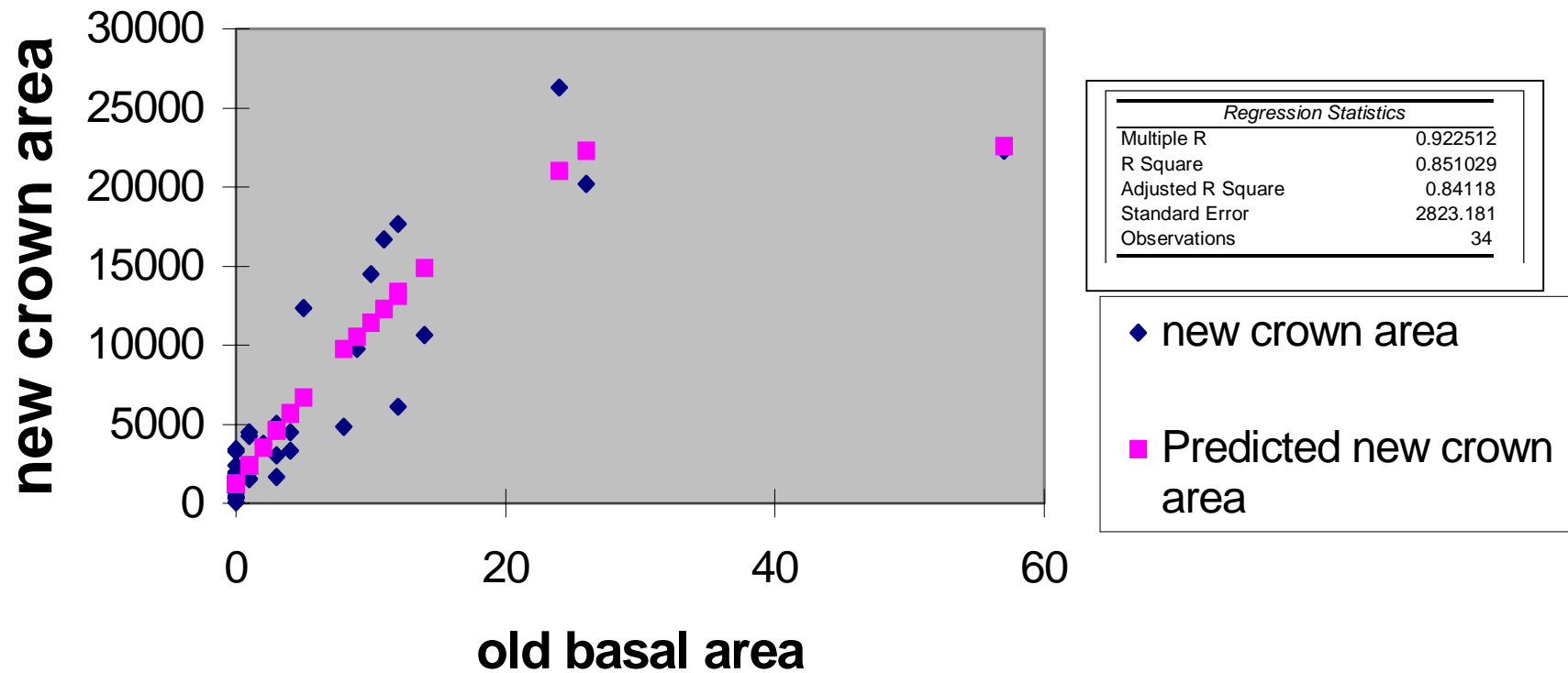


Figure I-1 Regression of current crown area as a function of basal area from original inventory



for individual trees were often imprecise, with no distinctions made between columnar and spreading forms. But, aggregate estimates are excellent.

Because off-street trees in residential areas provide far more canopy than street trees, the City's geographic information system and digitized aerial photos were used to measure the crown areas of off-street trees for the sample blocks, along with area of each block (bounded by the centerlines of surrounding streets) and the total length of planting strips. Thus the amount of canopy cover, the ratio between on- and off-street canopy, and street-tree spacing could all be determined.

GIS measurements of the City's aerial photo database were also made to determine the amount of canopy cover provided by the woodlands of Seattle's parks and greenbelts. Visible openings in the forest canopy were intentionally excluded to provide a measure of woodland canopy cover rather than area of woodlands.

A large gap in the City's photo coverage prevented GIS measurements for some of the re-inventoried residential blocks, all the downtown sample blocks, and some of the City's greenbelts. Because a number of re-inventoried residential blocks fell in this gap, an additional set of blocks from seemingly similar areas were selected for photo measurements only. The gap (expected to have been fixed by now) currently extends from a line through the southern boundary of the downtown area north to Galer Street and in a rectangular block covering Queen Anne, Capitol Hill, Fremont, on north to most of Green Lake.

Total canopy cover percentage for the City was determined by adding the component amounts and dividing by the City's total land area of 84 square miles.

15.5 percent of 63 square miles of residential area	9.76 square miles
Woodland canopy	10.67 square miles
12.5 percent of 5.1 square miles of CBDs/commercial	0.64 square miles
Industrial (assumed as zero coverage)	
Total for Components	21.07 square miles

*Percent total canopy coverage: 21.07 square miles / 84 square miles = 25.1 percent*

#### **D. Inventory, Workload, and Cost-tracking Capabilities**

Seattle's street-tree inventory, like those of many cities, is essentially static, with new records added but no systematic updating of old records. As a major upgrade, most of its records are now in the City's GIS, allowing ready access to whatever information is available on the tree(s) at any location. Unfortunately, most of the information is now eight to ten years old, and many trees are not in the inventory. Further, the system was not designed to track work records and costs or to project tree age, size, condition, and canopy as a basis for estimating upcoming workloads and costs as well as benefits.

Updating and acquiring even minimum information for all of Seattle's estimated 139,000 street trees is a daunting task--one not likely to be carried out any time soon. Further, the majority of these trees, even though on public rights of way, are the responsibility of abutting property owners. Even for trees the City maintains, its abysmal 19-year pruning/maintenance cycle provides very little opportunity for routine updating of information

Unless Seattle drastically changes policy and takes responsibility for all trees on public rights of way, its tree managers should consider making a clean dichotomy between the **public** trees for which they take responsibility and the **private** trees for which they do not. For public trees, managers need an inventory system that provides information for **effective management**. For private trees, they need an inventory system that provides information for **effective policy**.

Because quite different information is needed for management of public trees and for policy concerning private trees, it is recommended that the current inventory be split into two separate inventories and inventory systems:

1. A continuous inventory for public trees that includes work records and costs and can project tree numbers into the future in terms of age, size, canopy, and condition. Such a system would provide a sound basis for determining cost-effectiveness and projecting future workloads and costs as well as for diagnosing current, benefits, challenges, and opportunities.
2. A sample-based system that, at intervals of five to ten years, estimates the number of private trees, their size and species distributions, and how much canopy cover they provide.

A continuous inventory requires sustained commitment and a stable staff. Although, in the Cities of Santa Maria and Oakland in California, managers found that it took less than half a person-day per week to maintain records for 30,000 trees, that person had to be there. Too often, inventory systems collapse because the person responsible for maintaining records moves on without the immediate recruitment and training of a replacement.

Tree crews (with training to overcome their traditional aversion to "paperwork") are the best source of continuous information for updating records, and upgrading to a continuous inventory system for public trees needs to be coordinated with a greatly reduced pruning/maintenance cycle, down immediately to no more than 9 years and eventually still shorter. With a shortened cycle, crews can shift to **scheduled maintenance**, rotating through sections of the city and staying in each for some time, greatly reducing the percentage of time spent in travel and set-up, usually reducing the per-tree cost by about half.

Rather than incurring the development costs and debugging of an upgraded system for continuous inventory of public trees, the City should explore the several excellent systems developed by commercial vendors, with the bugs already corrected and

development costs spread among many users. (By seeking a "custom" package locally, SEATRAN saddled itself with inadequate inventory software that created years of headaches. Problems in retrieving records have been largely solved by mapping tree records into the City's GIS, and such mapping needs to be retained in whatever upgraded system is adopted.)

With the provision that tree crews submit not only work-record information but upgraded inventory information whenever they maintain a tree, any new funding should be spent for tree-crew personnel and a reduced maintenance cycle rather than solely for new inventory information. And, if a continuous inventory system is limited to public trees, data needs can be greatly reduced for a system that provides greatly improved information for management.

With an adequate system for inventory and management records, the City could develop metrics for its cost-effectiveness. These might include cost per tree planted, cost for care of a tree during its first years of establishment, and cost per tree for pruning to an appropriate standard.

For private trees, periodic estimates of street tree numbers and their spacing and age/size/species composition, along with estimates of total canopy cover provided, would seem quite adequate as a basis for policy decisions. There seems little point in the City maintaining detailed records on trees for which it has no responsibility. Estimates at five to ten-year intervals would seem adequate and would provide information similar to that shown above. For another cycle, the sampling efficiency gained by relating current conditions to those of the original inventory will probably be workable. Thereafter, original patterns probably will not be very useful, suggesting such strategies as:

1. Rapid sampling of trees per block to establish a City-wide pattern, followed by additional detailed sampling of a subset of blocks having different numbers of trees. This approach would allow computation of relationships that could then be applied to the City-wide pattern.
2. Sampling in systematically-located areas (each an aggregation of perhaps 10 to 20 city blocks) with results then extrapolated to the entire area of the City.

Both approaches would probably avoid the problem of great variability in tree patterns within small areas, a problem that makes traditional stratified sampling difficult for urban trees. Additional information (narrative rather than quantitative) might be collected from commercial arborists concerning insect and disease problems, hazardous trees, and problem species.

Separating the inventories of public and private trees would keep costs manageable and improve the information available for both management and policy.

## **E. Value Computations**

The following section attempts to place an economic value on the City's urban forest. Value estimations involved the use of several computational procedures to derive an

overall economic value. The value is meant to be illustrative, recognizing that any valuation method is subject to the error of either under or over-estimation. The exercise was used to estimate a value for Seattle's urban forest asset, and this can gauge the resources needed to maintain and sustain this asset.

Because value computations required fairly long chains of assumptions, conservative values were selected for each. Street trees values were estimated using the 1988 procedures developed by the Council of Tree and Landscape Appraisers for the International Society of Arboriculture (ISA). Values for park and woodland areas are taken from the Department of Parks and Recreation 1986 Maintenance and Operations Management System Report. Additional indications of value were determined by estimating (1) how much trees add to real estate value and (2) what sum, invested at current interest rates, would provide the same return as trees add each year to revenue from real-estate taxes.

ISA formula procedures have been widely accepted by courts and insurance companies for establishing the value of urban trees. Their use extends most often to claims for the loss of individual trees, rather than to the valuation of an entire urban forest. (Procedures have been revised since 1988 and now require so much information for each tree that they are not suited to a mass estimate.)

1. **The cross-sectional area of each tree is computed from its diameter and expressed in square inches.** An average diameter below the mid-point of each diameter class was assumed, except for the 0 - 5" class where most trees begin with two- to three-inch diameters and a value of 4 inches was used. (Because area increases as the square of diameter, even using the middle diameter of each class would be conservative. For example, other things equal, a 16-inch tree would have four times the area and value of an eight-inch tree.)
2. **The number of square inches is multiplied by a standard value, which has risen over the years, to provide a base value.** A conservative value of \$50/square inch was used, equivalent to that used some years ago in most parts of the country.
3. **Because all trees are not equivalent, the base value is then adjusted with three multipliers, one each for species, condition, and location.** Each of these can range from 0 to 1.00. An average value of .70 was assumed for species value, somewhat below the average of regional values established by the ISA for the species involved. Location was assumed to be .60 for residential trees and .80 for trees in CBDs. Condition was taken from evaluation during re-inventory of sample blocks.
4. **The above numbers were then applied to the current numbers of street trees in each size class.** This number was determined by applying the size distribution from our sample data to the estimates of total trees (separately for residential and CBD categories).

Off-street trees in residential areas have 7.6 times the crown area and thus about 7.6 times the cross-sectional area of residential street trees (since both crown area and cross-sectional area increase approximately as the square of a tree's diameter). Because values depend on cross-sectional area, a case could be made that off-street trees have 7.6 times the value of street trees, justified in part by the fact that such trees are more personal and more under the control of owners than street trees. But, because some off-street trees are in groups that reduce the importance of any one tree, a conservative approach is to assume that these trees have only twice the value of residential street trees, that is  $2 \times \$130,000,000 = \$260,000,000$

**Table 1. Values for 128,850 trees in residential areas**

<b>Diameter classes (inches)</b>	0 - 5	6 - 12	13 - 20	21 - 30	> 30
<b>Assumed diameter (inches)</b>	4	8	15	23	31
<b>Cross-sectional area (sq in)</b>	12.56	50.24	176.62	415.26	754.38
<b>Value/sq in</b>	\$50	\$50	\$50	\$50	\$50
<b>Species (.70) x location (.60)</b>	.42	.42	.42	.42	.42
<b>Condition rating</b>	.88	.79	.80	.78	.69
<b>Value per tree</b>	\$232	\$833	\$2967	\$6802	\$10931
<b>Trees in diameter class</b>	63,008	48,190	13,400	2,577	1,675
<b>Value for class</b>	\$14,617,856	\$40,142,270	\$39,757,800	\$17,528,754	\$18,309,425
<b>Total value for street trees in residential areas</b>				<b>\$130,356,105</b>	

**Table 2. Values for 9,765 trees in business/commercial areas**

<b>Diameter classes (inches)</b>	0 - 5	6 - 12	13 - 20	21 - 30	> 30
<b>Average cross-sectional area (sq in)</b>	12.56	50.24	176.62	415.26	NA
<b>Value/sq in</b>	\$50	\$50	\$50	\$50	NA
<b>Species (.70) x location (.80)</b>	.56	.56	.56	.56	NA
<b>Condition rating</b>	.87	.89	.82	.80	NA
<b>Value per tree</b>	\$306	\$1,252	\$4,238	\$9,302	NA
<b>Trees in diameter class</b>	2,042	6,225	1,529	69	0
<b>Value for class</b>	\$624,852	\$7,793,700	\$6,477,902	\$641,838	0
<b>Total value for street trees in business and commercial areas</b>				<b>\$15,538,292</b>	

**Total value for all street trees****\$145,894,400**

For Seattle's park trees, the value of \$145,312,000 (for 103,200 trees) given in the Department's 1986 "Maintenance and Operations" report is, very conservatively, assumed still to be approximately correct. It was computed using the ISA formula current at that time. As compared with street trees, park trees average larger, increasing value per tree. But, park trees would usually have lower location ratings than street trees, especially when in stands or groups that tend to reduce the importance of each individual tree. Given inflation since 1986, plus the acquisition of new park areas, planting of new trees, and recognition that trees on the edges of the park system's natural areas have substantial value as well as maintenance needs, \$145 million is a very conservative estimate of the value of Seattle's park trees, and we can be comfortable that they are worth at least that much.

For trees in natural areas the 1986 report mentioned above assumed that these undeveloped areas are worth at least 25 percent as much as developed areas on a per-acre basis. If we assume that land suited for development is worth at least \$50,000 per acre (probably a gross underestimate even after deducting for roads, sewers, and other development costs) then Seattle's woodlands would be worth at least \$85 million (6,830 acres x \$12,500/acre). Because area of woodland *canopy* was measured, rather than area of woodland, this estimate would be somewhat low, even if the value per acre were pushed right up to market rates.

As a community, we have been willing to forgo the entire value these areas would have for development (not just 25 percent of it) in order to maintain greenbelt and park areas. Although it can be argued that many of these acres are not "buildable," it can also be argued that, with sufficient engineering, almost anything is now buildable. And, given Seattle's housing market, a great portion of this acreage probably would be developed if it were made available and regulations were adjusted to allow the necessary engineering.

So, a very conservative estimate of monetary value for Seattle's trees is, in round numbers:

<b>Tree Type</b>	<b>Value</b>
Residential street trees	\$130,000,000
Business/commercial area street trees	\$ 15,000,000
Residential off-street trees	\$260,000,000
Park trees in managed landscapes	\$145,000,000
Woodland trees	\$ 85,000,000
Total value of Seattle's trees	\$635,000,000

An additional approach to establishing the general magnitude of value for some of Seattle's trees (those in residential neighborhoods) is to estimate what they contribute to

real estate values and directly to the City in increased tax revenue. Over the years a series of studies have shown that trees around a home increase its value from 6 to 13 percent (up to 27 percent for vacant lots). (These studies are summarized in Robert W. Miller's 1996 book *Urban Forestry: Planning and Managing Urban Greenspaces*, 2nd ed.) If we assume, very conservatively, that only single-family residences and only a third of such residences in Seattle have their value increased by trees, and if we use the lowest increase found by the studies reported by Miller, we can compute that trees increase the assessed valuation of homes by approximately \$630 million and, as a source of increased tax revenue, are worth approximately \$131 million to the City of Seattle. These values are estimated as follows:

Seattle has 134,800 single-family residences (according to King County Office of Policy and Planning) with an average assessed valuation of \$232,800 (obtained from King County Assessment Department). Assuming that a third of these homes benefit from trees and that 6 percent of the assessed valuation is attributable to trees, we can compute the value of trees as

$$1/3 \times 134,800 \times \$232,800 \times .06 = \$627,628,800$$

This is consistent with the studies cited by Miller, which generally indicate that the values trees contribute to property values are greater than those computed with ISA evaluation procedures. It is also useful to consider what trees add to the City's tax revenue and what sum, invested at an appropriate interest rate, would generate an equivalent stream of revenue.

The 1999 levy rate was \$12.497 per \$1,000 of assessed valuation. Thus the revenue attributable to residential trees would be what they add to assessed valuation times the levy rate

$$\$627,628,800 \times 12.497/1000 = \$7,843,477$$

Current interest rates for the City's long-term borrowing are about 6 percent (Seattle City Light Department projects that it will need to pay 5.8 percent for funds to be borrowed this fall). To determine what sum would generate \$7,843,477 per year at 6 percent interest, we divide it by this rate to get

$$\$7,843,477 \div .06 = \$130,724,616$$

Although similar research apparently has not been done to determine how much trees increase the values of commercial enterprises, Marvin Black, Seattle City Arborist in the early 80s, noted that rents for office space were higher on streets with trees than for comparable space on streets without trees.



## **Appendix II. Community Framework**

### **A. Introduction**

According to the Clark model, which forms the basis for this analysis, a sustainable urban forest is one in which all components of a community share a vision for the urban forest and act to realize that vision through specific goals and objectives. In Seattle, a city-wide vision of the urban forest does not exist yet and not all elements actively participate in urban forestry. Meanwhile, some individuals and community organizations display a strong passion for trees and to the greening of Seattle. To some degree the City has successfully tapped that passion and mobilized the energy of volunteers in its efforts to increase canopy cover in residential areas and manage trees in its parks.

This appendix provides supporting information on each community framework category appearing in the matrix. The appendix is divided into two sections. Section B provides specific summary information about the points contained in the matrix. Section C includes findings from interviews and meetings with various stakeholders; Section C.1 outlines information derived from meetings with three city council members, Jan Drago, Nick Licata, and Richard Conlin. Sections C.2 and C.3 tables providing results from phone interviews with various community organizations and Business Improvement Associations (BIAs), respectively.

The interviews indicate strong political and local support for urban forestry in Seattle. Channeling those energies toward common objectives and actions represents a significant challenge. Fortunately, the level of support and commitment offers the City a strong community framework foundation with which to embark upon a successful urban forest initiative.

### **B. Matrix Summary Details**

#### *B.1 Awareness and Commitment to Urban Forest Vision*

No overarching urban forest vision exists in the City and there is no comprehensive vision for recognition of Seattle's green infrastructure. Definition of a vision and objectives for sustaining the urban forest ecosystem needs to occur as part of the strategy development. While the Urban Forest Coalition has developed a mission statement, and this internal effort offers an important step in defining the urban forest vision for the City, a vision must extend beyond the boundaries of the Coalition. The Coalition needs to identify and development concrete objectives and strategies to stimulate a more effective public outreach program that will provide citizens with a clear understanding of the value of the urban forest. This understanding should translate into greater commitment and support.

Most citizen groups, organization members and residents have difficulty identifying where the responsibility for trees lies in the City government. The public has limited knowledge of where to go or whom to contact regarding information about trees. While

the city has been effective in providing information on their web site on urban tree planting and care and publishing information for citizens on tree planting (such as the Urban Forest Coalition's "A City Among the Trees"), the information is not easily accessible.

### *B.2. Public Agency Cooperation*

City agencies play pivotal roles in implementing neighborhood programs. The Department of Neighborhoods tree distribution program offers an excellent example of public departmental collaboration. SEATRAN and City Light staff run this effective neighborhood-oriented tree planting and maintenance program, and these have been successful motivating citizens to plant trees. The Tree Steward program offers another example of effective cooperation among departments (SEATRAN, City Light and the Parks Department). Another program, the Tree Fund, provides trees while the matching grant program provides funds for urban forestry efforts. Agency and community representatives alike applaud the programs and their contribution to citizen involvement in tree planting.

While these programs are effective, there still remains little coordination within city departments on programs that promote similar environmental systems. For example, outreach programs promoting natural lawn care, water conservation and salmon protection do not include a focus on trees when trees play a major role in achieving many of the City's environmental goals. Common goals between City departments that focus on trees are few resulting in limited coordination of tree management efforts such as maintenance and care. Increasing the level of coordination among City departments is essential for effective use of funds and staff. Collaboration between different agency's staff and resources to produce educational materials will allow the urban forest message to reach citizens and provides budgetary and educational synergies.

### *B.3. Public Input and Development*

Opportunities for citizens, government and businesses to contribute to urban forestry policies and programs exist to a limited extent, but no formal mechanism is established to systematically obtain public input. Recent efforts to introduce new ordinances include opportunities for citizen participation. The new neighborhood parks, greens spaces, trail and zoo levy incorporates activities derived from citizen planning efforts and includes opportunities for citizen participation on a program oversight committee. However the fate of this levy is in the hands of the voters. If defeated, the City would not have a commission with citizen level participation contributing to policy development and oversight related to urban forest issues.

### *B.4. Regional Cooperation*

Regional Cooperation involves promoting the interaction among neighboring communities, regional groups, agencies and NGO's. Puget Sound Urban Resources Partnership (PSURP), one of several existing national URP (Urban Resource Partnership) programs, is an example of a successful collaboration with federal, state, and City governments, institutions and the private sector (Bank of America). PSURP offers matching funds for urban ecology projects including tree plantings, erosion control, and

restoration as well as public outreach and volunteer training programs. PSURP provides about \$500,000 per year (matched by \$250,000 from government funds) in grants to a range of projects that include activities that directly benefit the urban forest ecosystem.

The Mountains to Sound Greenway is another successful regional organization that has been actively fostering partnerships with regional businesses, institutions, organizations, individuals and cities in an effort to purchase, restore and link forest land from Puget Sound to the Cascades. The board of directors and advisors include industry leaders, local businesses, representatives of local governments and NGO's. The Mountains to Sound Greenway has successfully bridged partnerships for the completion of a 100 mile trail from Ellensburg to the Seattle waterfront along the I-90 corridor.

The Washington Department of Natural Resources supports cities' forest management efforts. Partial funding for Seattle's urban forest strategic efforts comes from the DNR and its Urban and Community Forestry Program. The program provides organizational and technical urban forestry assistance primarily to communities and interested local stakeholders.

Such regional partnerships are important in melding geographical and political boundaries through restoration and the preservation of valued habitat or green spaces. Extending the involvement to greater private sector and agency participation is needed to tackle regional-scale ecological issues such as water quality, green space corridors for wildlife and salmon habitat protection.

#### *B.5. Partners and Supporters*

The City has formed partnerships with local NGO's by providing matching grants to help fund specific tree-related projects. This has allowed the City to capitalize on the large volunteer force many local environmental groups have. For example, City Light contracts with TREEmendous Seattle to harness volunteer efforts in tree planting and in some maintenance work. The effort forms part of this agency's tree replacement program in which City Light plants three trees for each one removed.

The City could expand this contracting idea by formalizing a mechanism for groups to obtain grants and support more directly from the city. For example, a roster of volunteer organizations could be established for the City to draw on for regular or seasonal contract work. There could also be a pool of tools and equipment provided by the City that organizations could use on various projects.

Currently there is little in the way of partnership between the city and local businesses, corporations, or the green industry. Discussions with some BIAs indicated only moderate to low interest in urban forestry issues. The ordinances establishing BIAs do not include provision for tree management or care and the Associations view such activities as outside their mandate.

### *B.6. Neighborhood Involvement*

Neighborhood groups are a valuable component of urban society: it is from the neighborhood perspective that individuals feel a sense of community. From an urban forest canopy standpoint, the City's connection with neighborhoods and their activities is essential in sustaining the urban forest, as the trees in residential neighborhoods make up a majority of the City's forest canopy.

The City's Department of Neighborhoods runs a program to distribute trees to community groups. In 1999, 100 projects received approximately 2,300 trees. Since 1996 neighborhood groups have planted close to 6,000 trees in parks and on residential streets with an annual outlay of approximately \$100,000 and support from two part-time staff members. Recipients praise and support the program, with the only main complaint that the Fund provides no maintenance (funds and materials) support for the post-planting follow-up. Suggestions include increasing the coverage of the program to provide to the long-term maintenance needs of the recipient groups. City Light also works with volunteers in achieving its 3 trees planted for every one tree removed goal, as part of its community-level forestry efforts.

The City of Seattle provides neighborhood matching funds to neighborhood groups to support urban forestry activities. In 1999 and 2000, the City provided \$453,753 and \$439,000 respectively for projects related to urban forestry, parks and open space. Community contributions met or exceeded city allocations. Funding supported tree planting and management including infrastructure support. Communities received technical assistance from Parks and SEATRAN. These grants represent an important supplement to public budgets that support urban forestry.

### *B.7. Citizen and Individual Involvement*

Because trees on private property account for up over 70% of the forest cover in the city, citizen and individual involvement is critical for the continued maintenance and long-term health of most of the City's trees. The City's primary efforts focus on neighborhood and group tree planting with funding from its neighborhood sources. In many cases specific individuals stand out as active volunteers and lead the tree planting and maintenance efforts. Primary support comes from the Neighborhood Tree Fund where individuals link with neighbors to submit an application for trees to plant in their neighborhood. The applications are for a minimum of 10 trees.

The Tree Steward program was initiated by SEATRAN in the spring of 1994 to provide training and support to volunteers who want to do more for city trees and green spaces. The program involves cooperation between SEATRAN and the Seattle Department of Parks and Recreation, Seattle City Light, and TREEmendous Seattle. The program provides an opportunity for people to serve as volunteers in the community while providing the City with additional human resources for urban forest management. Volunteers praise the program while lamenting the lack of resources available as a constraint to their achievements.

The Seattle Parks Department has three volunteer coordinators covering three districts to channel volunteer interests into support for Seattle’s parks. In addition the department runs an adopt a park program that utilizes volunteers to plant trees and maintain park vegetation.

## **C. Summary of Interviews and Contacts**

### *C.1 Interviews with City Council Members and Staff*

City Council Members Jan Drago, Nick Licata, and Richard Conlin were interviewed to obtain perspective on their views of the City’s current urban forest activities, and to gain some insight into the issues that they feel strongly about regarding the City’s role in the urban forest. The interviews also sought to unearth solutions or ideas that Council members may have for protecting, maintaining and sustaining the City’s forest.

The interviews were informal conversations based loosely on one or more of the following questions:

**Attitudes.** What comes to mind when you think of Seattle’s trees or its urban forest? Are urban forests and the ‘Emerald City’ image an important part of Seattle’s local identity and reputation elsewhere? Do you think there is a general awareness among business and policy leaders including elected officials, that trees are more than just “another pretty face”, that they provide quantifiable economic and environmental benefits to the community? What do you think accounts for the lack of awareness/or awareness?

**Vision.** Research shows that Seattle has lost almost 40% of its tree cover in the last 25 years. How would you *like* to see Seattle’s trees 25 years from now?

**Benchmark Cities.** Part of our study involves comparing Seattle with other cities. Which cities do you see as good models for Seattle in terms of their trees and green spaces? What do you think Seattle could do to become more like those cities? What would like to know from their experiences?

**Overall Management.** From your perspective and what you hear from constituents, what does the City need to do to make our urban forest ecosystem viable? From what we’ve heard from the Urban Forest Coalition, they believe the urban forest is suffering seriously from benign neglect and that as a City asset, the urban forest is seriously under-funded. Do you share their perspective? Why do you think it has reached this point? Any thoughts on what it’s going to take to change the direction?

**Private Property.** More than 70% of Seattle’s trees are on private property. What kind of role, if any, should the City play in managing trees on private property – such as through education, regulation, or technical assistance for homeowners?

**Public Opinion.** Do you hear much from citizens and businesses about trees? What do they have to say? Are they interested in being involved in the City’s urban forest?

**Community Involvement.** How would you characterize community involvement in the City’s urban forest? Who do you think are the key players? Who *should* be involved? Highlights from these interviews are summarized below.

The outcome of the interviews are summarized below. In Section C.1.a, the Council member’s views on the current state of the urban forest are summarized. Section C.1.b lists recommended actions or ideas that emerged from the conversations.

### C.1.a The State of the Urban Forest

- The City is not adequately caring for the health of existing trees.
- Tree maintenance around power lines is often poorly executed resulting in damaged trees.
- City trees are often cut down with no explanation or public notification.
- Throughout the City there are examples of planting “the wrong trees in the wrong place”.
- Most calls about trees are complaints about trees interfering with power lines, and sidewalks.
- The value of trees is not adequately recognized by citizens.
- Funding is inadequate to cover the costs necessary to maintain the City’s trees.
- Business districts are fairly unreceptive to trees owing to high maintenance costs, interference with power lines, buckling of sidewalks and most importantly, blockage of businesses’ signs.
- Trees vs. views is a touchy issue; view protection regulations may encourage ruthless tree pruning by homeowners, while creating laws to protect trees interferes with private property owner’s rights.
- Public generally expresses affection for trees and enjoys tree planting activities.
- Trees are not being replaced at the rate they are declining, and at this rate the City will find itself losing the Emerald City identity.
- General public is not aware of the economic benefit of trees.
- Public does not know what it is missing.
- Loss of tree cover associated with development.

### C.1.b. Recommended Actions

- Need a vision for the urban forest to drive interest at all levels, from City government to citizens.
- Develop an ecosystem approach to urban forest management. This could involve linking salmon habitat protection, natural lawn care and other programs together with urban forest management to create a holistic, ecosystem-based approach.
- Design new legislation to expand forest management.
- Look into urban forest program that Bellevue has in place; their urban forest is impressive!
- Active outreach programs are needed to educate homeowners on proper tree care.
- Develop incentive programs to encourage business districts to become more involved in tree planting and maintenance.
- Offer homeowners incentives to plant and maintain trees such as a reduction in drainage fees for each tree planted.

- Tree planting incentive: Create a public announcement that asks citizens when the last time they heard birds singing outside their window. This may motivate them to plant trees.
- Expand the HeritageTree program to protect more mature large trees in the City
- One-stop location for tree-related questions.
- Encourage the proper site and species selection for plantings through outreach and education.
- Active promotion of urban forest through special events and citizen recognition.
- City should play a role in connecting neighborhood interest with citizen groups and NGO's to expand and promote urban forestry at the grass roots level rather than the top-down approach.
- Annual progress report issued on the status of Seattle's urban forest.
- Active promotion such as special events and citizen recognition to increase awareness about Seattle's urban forest.

## C. 2. Community Organization Interviews

Community Organization	Major Issues	Other comments
<b>Greenwood Community Council</b>	<ol style="list-style-type: none"> <li>1. Lack of Trees. Greenwood CC has mapped trees in their neighborhood, street by street. They have also located areas in their neighborhoods where there are not trees (such as in parking medians).</li> <li>2. New park in Greenwood. Trying to work with the City to plant ecologically appropriate species, such as meadow grasses instead of turf grass.</li> <li>3. Maintaining existing programs such as Tree Stewards.</li> </ol>	<p>Their view is that different agencies within the city don't talk; need to Coordinate with one another.</p> <p>Need specific guidelines for residents such as types of trees to plant, pruning tips and maintenance guidelines.</p> <p>Should be stricter regulations about maintaining trees.</p> <p>Cited NYC Parks department as doing a great job in maintaining NYC's trees</p>
<b>Washington Native Plant Society</b>	<ol style="list-style-type: none"> <li>1. Preserve as much greenspace as possible</li> <li>2. Long-term management of invasion of non-natives.</li> <li>3. More money to manage and expand programs.</li> </ol>	<p>Would like to see a heritage tree program whereby a conservation easement is granted to a heritage tree.</p> <p>Some regulation needed for trees on private property. One large tree on a property can benefit a whole neighborhood.</p> <p>Olmsted greenspaces in Seattle are unique – need to maintain healthy open green spaces.</p>
<b>Treemendous Seattle</b>	<ol style="list-style-type: none"> <li>1. Invasive species management - difficult for volunteers to handle.</li> <li>2. City should secure corporate funding to help fund tree maintenance. In other cities, corporate funding is a big component of tree budgets.</li> <li>3. City needs to offer educational courses on tree maintenance in all parts of the City.</li> </ol>	<p>City should utilize the large number of landscape professionals – offer certification programs so that these professionals can be hired by the city to teach workshops and do neighborhood outreach.</p> <p>Regulations on private property not wise – most people react negatively towards regulations.</p> <p>City shouldn't rely on volunteer labor exclusively. It's not a labor force that the city should depend upon.</p>



<b>Community Organization</b>	<b>Major Issues</b>	<b>Other comments</b>
<b>Friends of Interlaken</b>	<ol style="list-style-type: none"> <li>1. Educate park users on sensitive vegetation</li> <li>2. Not enough commitment from city for maintenance</li> <li>3. Parks department like a bureaucracy. Hard to talk to anyone. City forester is stretched too thin.</li> </ol>	City should offer workshops on removal of invasives, keeping neighbors from expanding their yards into the park via compost piles, dumping weeds, taking over portions of the parks.
<b>Seattle Audubon Society</b>	<ol style="list-style-type: none"> <li>1. Single biggest issue is controlling invasive species.</li> <li>2. Forest fragmentation also a concern</li> <li>3. City needs to focus on Coordination of all departments working with trees.</li> <li>4. Parks are facing a crisis point with regards to invasives and maintenance neglect. Not going to be beautiful parks in 20 years at this rate.</li> </ol>	<p>Misconceptions by the public regarding trees. Not many understand why trees are important, and many don't know the difference between natives and non-natives.</p> <p>Need education on "Gardening for Life" as many people are driving the life out of their gardens and yards with their current practices.</p>
<b>League of Women Voters</b>	<ol style="list-style-type: none"> <li>1. City should meet with open space advocates to team up on the activities surrounding trees and hear from these folks.</li> <li>2. Give tours of exemplary private property tree management</li> </ol>	<p>Property rights a touchy issue. Don't want the city telling property owners what they can and cannot do.</p> <p>Draw support from corporations (Boeing and Weyerhaeuser) to draw public interest.</p>
<b>Save Seattle's Trees</b>	<ol style="list-style-type: none"> <li>1. Pruning and maintenance are big concern, especially around power lines – devastating some trees.</li> <li>2. Vacant lots and open space not valued as a resource</li> <li>3. Not enough urban forest restoration and removal of invasives happening in City parks. No follow-up: new plantings get taken over by invasives</li> </ol> <p>Need a centralized office relating to all urban forest issues.</p>	<p>Perception that the City is afraid to do anything aggressive with regard to tree protection on single family home lots where the majority of building in the City is taking place.</p> <p>Citizen education and participation in controlling invasives is needed. City should hire kids during the summer to broaden the seasonal workforce.</p> <p>Tree protection ordinance: hope to see that it is mandatory and not voluntary. Need stronger arm for residents – they are frustrated by the process.</p>

Community Organization	Major Issues	Other comments
<b>Tree Committee, Wallingford Community</b>	<ol style="list-style-type: none"> <li>1. SEATRAN and City Light need to collaborate more on the maintenance of trees on ROW's and garden strips.</li> <li>2. Need tree protection regulations on private trees – lots of big, older trees coming down as people build up and want views</li> <li>3. Public education is poor.</li> <li>4. Most residents plant trees for “home beautification”</li> </ol>	<p>Residents are not very smart about pruning – one neighbor nearly killed himself trying to cut off a big branch of a tree in his yard. On 40<sup>th</sup> St., City Light severely pruned a number of large, older trees. City Council had approved cable addition, but when people called with concerns about trees, they got “barked at”.</p>

Community Organization	Major Issues	Other comments
<b>Plant Amnesty</b>	<ol style="list-style-type: none"> <li>1. Chain of command in the City is lacking. No clear place to go; who should homeowners call. Seems like there are turf wars within divisions with no clear agreement on who's doing what</li> <li>2. Need a stronger legal structure to prevent topping and poor pruning jobs.</li> <li>3. City is not pro-active in it's role in education</li> </ol>	Other cities have much more stringent tree regulations. Denver tested their arborists and this resulted in a reduction of topping.
<b>INTERIM</b>	<ol style="list-style-type: none"> <li>1. Businesses do not view tree planting or tree management as a first priority.</li> <li>2. City is short on staff to for tree maintenance and they take a long time to respond to pruning requests.</li> <li>3. INTERIM planted trees in collaboration with city and with federal funding; received good collaboration from all parties.</li> <li>4. Some BIA's have maintenance crews who could contribute to street tree maintenance.</li> </ol>	<p>At the same time that trees are not a high priority in day-to-day life, residents really support trees and can't imagine their neighborhoods without trees.</p> <p>Vancouver viewed as a greener city than Seattle with more shrubs and trees.</p>
<b>Leschi Community Council</b>	<ol style="list-style-type: none"> <li>1. Invasive species a large problem.</li> <li>2. Lack of funding to acquire more land to expand the park areas.</li> <li>3. Maintenance a big concern. Easy to get people involved in planting but less interest generated in maintenance.</li> <li>4. Shifting of personnel in parks is disruptive.</li> </ol>	<p>Project funded from the neighborhood matching grant program worked very well.</p> <p>Received good support from the Parks Department and was very satisfied with support.</p>

Community Organization	Major Issues	Other comments
<b>Individual Grantees of the Neighborhood Urban Forestry Program</b>	<ol style="list-style-type: none"> <li>1. Individuals can access trees and organize plantings. Maintenance represents to prime challenge for the success of the program.</li> <li>2. Would like more support from the city for maintenance. One person mentioned the establishment of mulch collection points or stockpiles for citizens or neighborhood tree stewards to access and use.</li> <li>3. Availability of tools and maintenance equipment represents a constraint.</li> <li>4. No mechanism in place to allow program participants to give feedback on program operations.</li> </ol>	<p>Kudos to the city for the program  Good policy and is effective to ensure trees are planted.  Effective in pulling the community together.</p>

### *C.3 Business Improvement Area Interviews*

<b>BIA</b>	<b>Major Issues</b>	<b>Other comments</b>
West Seattle Junction	<ol style="list-style-type: none"><li>1. Trees blocking signage and business visibility</li><li>2. City should have worked with the businesses to determine placement and selection of trees</li><li>3. Maintenance has been poor.</li></ol>	<p>5 years ago the city undertook a large tree planting effort in this Business District. Now, several years later, nearly all businesses wish the trees could be removed.</p> <p>The city charges a fee for awnings, then plants a tree blocking awning visibility. No consultation with businesses before planting the trees.</p>
Pioneer Square	NONE	This BIA does not do anything beyond what the city currently undertakes to maintain Pioneer Square's trees. No activities or special planting/maintaining efforts.
Chinatown/International District	<ol style="list-style-type: none"><li>1. City has a long waiting list for pruning. Had to wait a long while for city to come a prune</li></ol>	This BIA is not involved in any additional activities beyond what the city currently undertakes to maintain trees in Chinatown/ID.

## **Appendix III. Resource Management**

### **A. Introduction**

Resource Management in the context of the Clark model includes the operational guidelines for management as well as the philosophy behind the management. Specific policy vehicles must exist to protect trees, manage and train staff, and apply standards and protocols. Commitment to the development of a management plan and sufficient funding to implement it represents another important facet of the resource management strategy.

This appendix provides background information related to the resource management section of the matrix and details policy and management issues related to urban forest management in Seattle. Current policy initiatives demonstrate a strong commitment by the city to tree management and protection. The PROPARKS levy proposed by the City will not only contribute to the potential expansion of vegetated areas under city protection and management but also provide funding for maintenance to supplement department budgets.

Despite the progress management concerns exist. Staff feel taxed and current staffing levels appear inadequate to manage existing programs effectively, maintenance of the City's forest resources, and respond to crises. Although coordination is improving on the policy and planning front, budget coordination is limited. The development of specific mechanisms that result in joint departmental budgeting for urban forest may be required to increase urban forest management's effectiveness and efficiency.

### **B. Matrix Summary Details**

#### *B.1 City-wide Management Plan*

The City does not currently have a city-wide management plan for the urban forest. A management plan plays an important role in pulling together a shared vision for the city's tree management and making clear the procedures and steps required to carry out the vision. The management plan should include such elements as performance standards on tree care, requirements for canopy preservation and retention in new development, and maintenance requirements for existing and new trees.

#### *B.2 Urban Forestry Policy*

Policies for protection of the urban forest include city-wide ordinances on the protection of heritage trees, street trees and private trees. Such ordinances should include pruning standards and guidelines for watering and mulching trees - from newly planted to mature. Fines exist for indiscriminant damage of city and some private trees but these suffer from lack of enforcement.

The City is currently in the process of establishing new ordinances and policies for tree protection and management. The process involves participation of various city departments as well as public input. A land use amendment that protects trees on land slated for development

was developed with the DCLU. The ordinance ensures that developers either maintain a certain tree cover or replace trees lost in construction.

The issue of tree management on private property remains a challenge and the effectiveness of legislating tree management and maintenance on private land is questionable. Legislating management of the city's trees shows more promise but the issue of enforcement requires attention.

### *B.3 Urban Forest Practices*

The health and well-being of trees in the City's parks, open spaces and private property is dependent on sound stewardship practices that include pruning and mulching at regular intervals and regular watering during the summer dry months (with special attention given to age of tree with regard to watering frequency). Standards for tree care such as ISA's Tree Pruning Guidelines are important elements for any forest practices guidelines.

Seattle has established tree care guidelines but support for maintenance remains weak owing to insufficient resources. Most programs focus on tree planting rather than maintenance and a greater commitment to and coordination around tree maintenance will improve the health of the City's urban forest. Increased funding for maintenance through the neighborhood program, for example, would foster greater involvement of volunteers in the maintenance of the trees they plant.

### *B.4 Funding*

The lack of coordinated budgets for urban forestry inhibits the identification of precise expenditure figures for the City's tree-related activities. Budget categories and allocations differ across the various departments and some urban forestry activities are non-budgeted. How specific activities are accounted for depends on the department.

The budget numbers provided represent a best estimate of yearly budgeted expenditures on urban forestry activities. The major budget analysis difficulty was the calculating City's Light's total investment in urban forestry. City Light expenditures represent estimates based on the amount of time spent by contract crews and staff on urban forest issues within the City. City Light has line clearance and tree removal and planting responsibilities outside Seattle and budgets are not differentiated by location. Another issues arose whether to include powerline clearance as a legitimate urban forestry management budget item. Some argue that tree clearance from powerlines might fall more appropriately within a utility maintenance budget. This analysis provides two scenarios, one that includes the powerline clearance budget and the other that does not.

The total budget shown represents the total capital and operating costs for each department. For budget scenario one, the total includes the cost of Seattle City Light's power line clearance undertaken as part of line maintenance. The scenario 2 budget table excludes the powerline clearance costs and only includes the estimated figures for the Urban Tree Replacement Program.

The sections following the two tables describe each department's structure and funding with regards to city trees, and includes an explanation of all assumptions made in compiling the budget.

### Total Budget Scenario 1

<b>Department</b>	<b>Budgeted</b>	<b>Non-Budgeted</b>	<b>Total Annual Expenditure</b>	<b>Staffing Levels</b>
City Light with all costs considered	\$1,555,135		\$1,555,135	1 UTRP Arborist (55%), 2 powerline clearance coordinators (one 60% and one 40%), 1 Administrator (35%), landscape crews mainly for mowing.
SEATRAN	\$934,925		\$934,925	1 Arborist, 4 Arboriculturalists, 1 Sr. Landscape Architect, 1 Program Information Coordinator; 2 person tree crew.
Parks	\$818,000	\$173,050	\$991,050	Sr. Urban Forester, Urban Forester, six member tree crew, trails coordinator
Seattle Center	\$10,000		\$10,000	5 FTE doing 250 hours on tree maintenance
Neighborhoods		\$100,000	\$100,000	2 staff with part-time responsibilities
Total Expenditures	\$3,318,060	\$273,050	\$3,591,110	



### Total Budget Scenario 2

Department	Budgeted	Non-Budgeted	Total Annual Expenditure	Staffing Levels
City Light with only UTRP-related costs	\$259,903		\$148,750	1 UTRP Arborist (55%) and administrative support.
SEATRAN	\$934,925		\$934,925	1 Arborist, 4 Arboriculturalists, 1 Sr. Landscape Architect, 1 Program Information Coordinator; 2 person tree crew.
Parks	\$818,000	\$173,050	\$991,050	Sr. Urban Forester, Urban Forester, six member tree crew, trails coordinator
Seattle Center	\$10,000		\$10,000	5 FTE doing 250 hours on tree maintenance
Neighborhoods		\$100,000	\$100,000	2 staff with part-time responsibilities
Total Expenditures	\$2,022,828	\$273,050	\$2,295,878	

#### *Per Capita Expenditures*

These two scenarios indicate the City's per capita budget ranges between \$4.25 and \$6.60. These figures place Seattle firmly in the middle between cities have low per capita expenditures (less than \$2.00) and those with high per capita expenditures (exceeding \$18.00). Seattle faces two important considerations. The first is to increase per capital expenditure to a level that will provide sufficient funds to attain management objectives. The optimal expenditure level is certainly higher than the current level of \$4.25, but determining the optimum upper limit requires further assessment. The second involves evaluating the efficiency of operations under the current budget levels to determine whether efficiency improvements alone (or with some budget increase) could lead to realization of urban forest management goals.

## *Budget Explanations*

### City Light

The City Light budget for vegetation management includes all activities in Seattle, Lake Forest Park, Shoreline, Unincorporated King County, Tukwilla and SeaTac. Boundaries in the north are consistent with the King County boundaries.

There is no differentiation in the tree budget between Seattle and the six non-Seattle areas. We based budget estimates for the Seattle budget allotment for tree management on the following assumptions provided by staff at City Light.:

- 55% of the contracted tree maintenance work occurs in Seattle.
- Staff members allocate a certain percentage of their time for work in Seattle. City Light provided percentage figures for that time allocation. These percentages multiplied by the hourly-billing rate used by City Light and 2,000 hours per year, yielded total staff costs.
- Landscape maintenance crews received no allocation because City Light indicated that their role was primarily mowing. Any hours spent by these crews on tree-related work lies within the City's total expenditures, however, the amounts would be insignificant.

We determined operating costs (staff costs) by assuming the percentage time worked in Seattle multiplied by an hourly rate and assuming 2,000 hours per year.

For scenario 2 the budget assumes 55% of the UTRP arborist and administrative staff salaries as well as the same percentage for materials and supplies. This approach may not provide an exact number but gives an effective approximation of the resources dedicated by City Light to urban forest oriented activities outside its power line maintenance program. The \$259,903 estimate does not include an estimate for senior management time. Consequently this budget figure may underestimate the department's urban forest expenditure. Although the precise figure is not known, the amount expended is significantly less than the overall tree-related budget as reported in scenario A.

### Parks Department

The current annual budget for the parks Urban Forestry Unit is \$818,000. In addition grounds maintenance staff contributes an average of 6,922 hours per year which is equivalent to approximately \$173,200. This non-budgeted figure increases Parks total urban forest expenditures to \$991,000.

If the city approves the budget submitted by Parks for fiscal year 2001, the funding available for urban forestry through Parks would increase nearly 32% to just over \$1.3 million.

## SEATRAN

The SEATRAN budget including capital budgets and administration is \$927,000. In addition, in 1999, SEATRAN created a contract with Plant Amnesty as part of a matching grant for the Heritage Tree Recognition Program. As part of the contract SEATRAN provides \$3,375, with an additional \$4,550 provided as in-kind support from the City. Plant Amnesty provides \$5,500 to bring the total to \$13,425.

## Seattle Center

The Seattle Center spends approximately \$10,000 per year on tree management. Five full-time staff (gardeners and arborists) spent approximately 240 hours on trees in 1999.

## Department of Neighborhoods' Tree Fund

The Neighborhood Matching Fund Program with a \$4 million budget runs an Urban Forestry Project Fund. The program provides approximately \$100,000 for trees on an annual basis. These trees go to individuals and community organizations that request the trees through a formal application process. For management of this fund the Department of Neighborhoods provides two staff people on a part-time basis. The \$100,000 provided for this project is not budgeted to urban forestry per se. However, the program appears committed to consistent annual support levels for tree planting in the City. Thus we include it as an annual allocation to the urban forestry budget.

In 1999 the Fund provided 2,335 trees to 100 projects. Project recipients indicate effective and strong collaboration with the City staff for those efforts. Since 1996, neighborhood groups have planted nearly 6,000 trees.

## Other

One recommendation that has emerged from the budget analysis is the development of a forest management plan that would draw on both public and private funding. This would involve partnering with local businesses fostering public recognition of these businesses and other partners in their contributions. Communities can tap private sector sources for their matching funds, including donations from companies and neighbors, allowing for significant in-kind contributions through private sector support.

Support from large regional corporations represents another important funding source for urban forestry. Recently the City of Seattle received \$500,000 from AT&T as a contribution to its millennium Tree Legacy Program. Numerous other civic operations (such as the Woodland Park Zoo, Seattle Opera, and Seattle Aquarium) receive gifts from corporations and these donors are recognized in the publicity and other materials they distribute.

The pending PROPARKS levy provides an opportunity to establish funding for the maintenance of new areas and the existing urban forest area. Establishing long-term financing mechanisms to support maintenance as part of an acquisition or new planting agenda is highly desirable.

### *B.5 Staffing*

Trained staff are essential for urban forest management. The city could offer contracting agreements with the many licensed, or ISA certified arborists in the City, providing on-going training and testing to make sure proper techniques are used. (Denver tested their arborists and found that the quality of pruning improved greatly.)

Discussions with City staff and community groups indicate lower than required staffing levels to manage the city's tree resources. The recent loss of one promised tree crew was initiated by I-695 and this exacerbated an already over-extended staff. The City needs to ensure that it has sufficient staff to meet the objectives established in its urban forest strategy.

The City has competent and well-trained people and has other landscapers with varying degrees of training. Building the capacity of landscapers as well as volunteer tree stewards will help extend the reach of city arborists and arborculturalists.

### *B.6 Assessment Tools*

A major challenge for the City is the maintenance of its tree inventory. Data input demands exceed staff-time available for entry, consequently the tree inventory is out of date. Establishing a mechanism for updating the inventory represents an important management and planning objective.

With the development of a strategy the City will have well-established objectives. These objectives will have corresponding outputs against which progress can be measured. The monitoring plan needs to outline the tools and responsibilities for assessment and ensure that mechanisms and funding are in place. At present those mechanisms do not exist.

### *B.7. Regulations and Incentives*

The Urban Forest Coalition has embarked on an effort to review and redefine ordinances in support of tree protection and management. This effort will result in legislation that will provide important rules governing the management of the City's trees. Once approved by voters, enforcement will be important to indicate to the citizens the level of importance the City's places on trees.

Managing trees on private property may require non-legislative options. Even land-use development requirements may have little effect on future homeowners who decide to remove a tree from their property. Incentives to homeowners and businesses to plant and maintain trees may be more effective. A Seattle voter survey (in progress) may yield insights into potential citizen responses to regulations and incentives.

Incentives to businesses and citizens might include annual recognition by the Mayor or City Council for acts in support of urban forestry. Recognition and a receipt of an award may

motivate businesses and citizens to participate more actively in meeting urban forestry objectives.

## **Appendix IV. Urban Forest Trends in U.S. Cities - Literature Review and Survey of Selected Cities**

### **A. Introduction**

How do the urban forestry programs of the City of Seattle compare to other U.S. cities? The question can be answered in several ways. This appendix provides a summary of information, derived from multiple sources, regarding the scope and support of urban forestry operations in large cities of North America.

The sustainability model proposed by Clark et al. provides a useful framework for assessing the components of an urban forestry program. The three dimensions of vegetation resource, community support and management are a comprehensive approach to understanding any program's strengths and shortcomings. Yet, there are no absolute indicators and measures of model performance. Estimations of successful achievement of the indicators must be placed within the context of economic conditions, competing city needs and programs, and broader urban resources management practices.

This report provides comparison data intended for sustainability assessment. It contains two types of data and information. First, prior studies addressing program performance were collected from scientific and professional sources. Then, interviews were conducted with program administrators or managers of a small sample of municipalities to collect more detail about the resources and operations of similar U.S. cities.

All data and information from the literature review and interviews are summarized in the sections that follow. Key points from each of the sections have been entered in the sustainability assessment matrix.

The current condition of the City of Seattle's urban forestry programs is the product of historic decisions about personnel, resource allocation and departmental responsibilities. Comparison of Seattle to other studies and cities helps us to understand the choices that can be made to enhance the sustainability of Seattle's program in the immediate and distant future.

### **B. Tree Cover Analyses - American Forests**

American Forests, America's oldest not-for-profit conservation organization, has been conducting tree cover and natural resource assessments for U. S. metropolitan areas in partnership with municipal and regional governments.<sup>3</sup> These assessments are analyses of the green infrastructure of urban areas - the trees, shrubs and systems that sustain them. The analytic measures include the size, condition and economic value of urban forest ecosystems. In turn, recommendations are provided that help communities set goals to improve the health of their urban forests.

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<sup>3</sup> American Forests. 1997. The State of Our Urban Forest: Assessing Tree Cover and Developing Goals. Washington, D.C.: American Forests.

### *Tree Cover Standards*

Tree cover, or tree canopy is the central measurement used by American Forests to determine the condition of urban forests. While urban ecology is more complex than just trees, tree cover is a good indicator of the health of an urban ecosystem because the health of the trees and the ecology are directly related. An average tree canopy goal of 40% has been established for urban areas based on studies by urban forest scientists and public policy makers. Tree canopy goals for subzones within metropolitan areas are: business districts 15%, urban residential 25%, and suburban 50%. Increasing urban tree cover to the 40% cover goals nation-wide would produce ecological dollar benefits (including stormwater management) at over \$100 billion per year.

### *Economic Benefits Calculations*

Healthy urban forest ecosystems provide communities with many valuable services that can be measured in dollar benefits. The value of trees for stormwater management is a good example. Trees slow stormwater runoff and reduce peak flows. Additional ecological values produced by urban forests - improved air and water quality, energy conservation, and wildlife habitat enhancement - increase the importance of maintaining and restoring the natural infrastructure of our communities (edit to be more concise).

### *Comparison of City Analyses*

An Urban Ecosystem Analysis of Seattle was conducted in 1999 using City Green GIS software and remote sensing data.<sup>4</sup> Similar studies have been done for other cities from 1996 to the present.<sup>5</sup> Table 1 displays the results from the multiple studies. Given the reputation of Seattle as the "Emerald City" the 13% average tree cover is alarming.

While some zones of the city may meet or exceed the 40% canopy cover recommendation other areas are deficient, reducing the net average. The 48% tree cover loss in a 25 year span also raises red flags, suggesting that steps should be taken to identify and tame the causes of tree loss in the city. While the benefits calculations of current and increased tree cover are "broad brush" estimates they do confirm that trees provide more than just amenity benefits to city inhabitants.

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<sup>4</sup> American Forests. 1999. Urban Ecosystem Analysis of Seattle, Washington: Calculating Tree Cover Loss and Related Values in the City of Seattle.

<sup>5</sup> Reports and summaries are available at [www.americanforests.org](http://www.americanforests.org)

**Table 1: Canopy Cover Analysis and Benefits Calculations**

City	Tree Conditions			Annual Benefits From Existing Trees		Benefits From More Trees	
	Ave Tree Cover	Tree Cover Loss	Time Period	Air Quality	Stormwater Mgmt	Air Quality	Stormwater Mgmt
Atlanta, GA	27%	60%	1972-1997	\$15 M	\$883 M	\$7 M	\$358 M
Austin, TX	34%	14%	1973-1977	\$31 M	\$1,423 M	\$6 M	\$197 M
Baltimore, MD	31%			\$11 M	\$340 M	\$3 M	\$102 M
Milwaukee, WI <sup>*</sup>	**16%/18%			\$8 M	\$305 M	\$10 M	\$220 M
Miami/Dade, FL	*10%			\$4.8 M		\$7.8 M	
Seattle	13%	48%	1972-1996	\$657 K	\$41 M	\$1 M	\$5.1 M

\* extensive hurricane loss

\*\* extensive Dutch Elm disease loss

### *Report Recommendations*

The UEA closed with recommendations based on the data analysis. Several are directly pertinent to achieving sustainability of Seattle's urban forest, including:

- + Raise public policy questions for land-use planning and growth management (such as economic values and a natural resource data layer in zoning)
- + Increase tree canopy cover (25% in residential, 15% in CBDs)
- + Implement GIS for land-use planning and tree/forest management
- + Develop tools to increase tree cover in new development (including tree canopy estimates on new projects)

### **C. Urban Forestry Trends - California Studies**

With increasing urbanization, California's state government has launched a program of research and communications to assist individual municipalities with urban forestry policy and planning. State leaders have been concerned over the health and management of trees in urban environments. One state-wide activity has been a periodic survey of municipal programs. The state government is pursuing benchmark data in order to understand changes in the conditions and needs of the state's urban forest. Surveys of municipal programs have been conducted in 1988, 1992 and 1997. A report of the last survey was recently published.<sup>6</sup>

The 1997 report does not provide data on specific city programs but provides an overview of program operations and trends. Data collection was structured along the lines of the

<sup>6</sup> Thompson, R. P., J. J. Ahern. 2000. The State of Urban and Community Forestry in California: Status in 1997 and Trends Since 1988. Technical Report No. 9: CA Department of Forestry and Fire Protection. Copies available at: <http://urbanfor.cagr.calpoly.edu/data/abstracts/abstracts.html>



sustainability framework of trees or forest, community and management. More than 500 incorporated cities and counties were contacted; 256 cities and 14 counties responded. About 30 cities having population of 100,000 or greater responded.

The Puget Sound region and the City of Seattle face urbanization and growth challenges similar to those experienced by many of California's communities. Figure 1 is a copy of the Executive Summary of the report. The summary yields insights on the challenges and opportunities that Seattle's program experiences now, or will soon.

Highlights of the summary address net loss of trees, species selection, tree maintenance, local funding, professional standards, inventories, handling of green waste and tree ordinances. Relevant information is included in Seattle's sustainability assessment matrix.

#### **D. The State of the Urban Forest - Historic Studies**

Perhaps the most informative litmus of urban forestry program status and condition is national data on the "State of the Urban Forest." To date four nationwide surveys have been completed assess the conditions of the city forests and support programs in the United States - 1974<sup>7</sup>, 1980<sup>8</sup>, 1986<sup>9</sup> and the most recent in 1994<sup>10</sup>.

The 1994 survey was a 67-item written self-report questionnaire. Questions addressed the characteristics of municipal programs, including staffing, funding, management approaches, community outreach and tree policies. Respondents were also asked about perceived challenges to effective urban forest management. 1,228 communities were surveyed and the response rate was 34%. Responses were sorted by city population size; 95 of the responding cities had population of 100,000 or greater and are featured in this summary.

Below are excerpts from the study report.<sup>11</sup>

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<sup>7</sup> Ottman, K & J. Kielbaso. 1976. Managing Municipal Trees. Urban Data Service Report. Washington D.C.: International City Management Association.

<sup>8</sup> Giedraitis, J. & J. Kielbaso. 1982. Municipal Tree Management Urban Data Service Report, Vol. 14, No. 1. Washington D.C.: International City Management Association.

<sup>9</sup> Kielbaso, J. B. Beauchamp, K. Larison & C. Randall. 1988. Trends in Urban Forestry Management. Baseline Data Report 20(1). Washington D.C.: International City Management Association.

<sup>10</sup> Tschantz, B. A. & P. L. Sacamano. 1994. Municipal Tree Management in the United States. International Society of Arboriculture Research Trust and USDA Forest Service.

<sup>11</sup> Note: All expenditures in text and tables adjusted upward 15.52% - increase in the Consumer Price Index 1994-2000 according to the U.S. Department of Labor Bureau of Labor Statistics.

## Figure 1. The State of Urban and Community Forestry in California

Status in 1997 and Trends since 1988

### Executive Summary

- Though planting trees in urban areas continues to be a significant achievement, especially by volunteer groups, the aging urban forest results in **25% more trees removed than planted**, as compared to 18% in 1988 and 1992.
- The species favored for planting tend to be smaller, shorter-lived, providing fewer of the potential benefits that trees offer in urban areas. This selection is driven heavily by the lack of space available for planting due to concerns over interference with utility lines, sidewalks, etc., and long-term maintenance costs.
- Cities continue to be the group that maintains trees, while developers are the ones who pay for and plant them. Residential homeowner's role in all three areas is declining. 'Ownership' of trees by other sectors needs to take place, especially by homeowners.
- There has been an increase in urban and community forestry (U&CF) programs funding since 1992, averaging a little over \$5 per resident. U&CF funding is strongly related to the State's overall economic strength, since over 70% of the funds for these programs come from the cities general fund.
- Increasingly U&CF programs are aligning with the Parks & Recreation divisions in cities rather than Public Works.
- Standards for pruning trees continue to be emphasized, as opposed to the old, unacceptable practice of 'topping.' Over 90% of the U&CF employees are certified according to some professional standard, usually the International Society of Arboriculture.
- More programs are investing in inventories of their urban forests, helping to reduce costs through improved planning.
- The tremendous volume of "greenwaste" from tree trimming and removals is increasingly seen as a valued resource rather than a cost. Around 20% of the cities utilize these raw materials for solidwood products like lumber, and specialty wood products. Other uses include chipping for mulch, energy and firewood use.
- Though the trend in tree ordinances continues, their effectiveness is not consistent for all types of provisions. This is especially true of tree planting which must be seen as a long-term commitment to protecting trees on private property.
- U&CF programs can provide significant reductions in tree-related hazards, improve real estate values, stimulate growth in business, enhance civic pride, and improve air quality. However, these benefits need to be translated into funding returns to the U&CF programs in order to maintain this significant investment in city infrastructure.

### *Funding Levels*

Effective municipal tree management requires many resources. Skilled labor, appropriate equipment and consistent planning and management are essential components of any municipal tree management program - and these components require funding. Table 2 provides information about mean municipal tree management budgets by population. The reported range of per capita spending is from \$1.56 to \$4.17 for cities of 100,000 and larger. In comparison, the City of Seattle has a \$3.6 million tree budget and a population of 540,000 people, thus spending \$6.60 per person on trees (including expenditure on power line clearance).

### *Funding Sources*

Municipal budgets are not the only source of funding for many urban forestry programs. While general funds are an essential and important resource and are often the core support of a program many survey respondents reported income from other sources. Table 3 is a list of the percentage of respondents (of all population size municipalities) that use various funding sources, and the mean amount of funding used.

**Table 2: Municipal Tree Management Budgets by Population**

<b>Population Size</b>	<b>Mean Municipal Tree Management Budget</b>	<b>Mean Per-Capita Municipal Tree Management Budget</b>
Over 1,000,000	\$1,556,825	\$1.56
500,000 to 1,000,000	\$1,949,622	\$2.60
250,000 to 499,000	\$1,565,072	\$4.17
100,000 to 249,000	\$596,425	\$3.41

**Table 3: Funding Sources Used for Tree Management Programs**

<b>Funding Source</b>	<b>% Respondents Using Funding Source</b>	<b>Mean Amount of Funding Used</b>
General Municipal Funds	66.6%	\$297,065
General Forestry Grants (state and federal programs)	28.9%	\$31,420
Other (donations, landscape and lighting assessments, tree funds)	22.9%	N/A
Community Development Block Grant	8.8%	\$36,261
Gas Tax	7.4%	\$241,769
Endowment (planting or maintenance)	5.5%	\$33,751
Special Frontage Tax	1.7%	\$218,429

The Seattle urban forestry programs have pursued alternative funding, including support for the *City Among the Trees* citizen outreach publication and funds to develop an urban forestry strategic master plan. Other opportunities should be considered and evaluated.

33% of responding cities reported having partnerships with non-profit tree advocacy groups, and 32% reported partnerships with private groups (such as utility companies). Citizen action groups can potentially assist with funding support. Citizen groups also provide in-kind support of an urban forestry program through assistance with planting or by educating the public on tree management.

### *Funding Allocation*

Administratively, urban forest operations and funding often happens within several departments or agencies. Table 4 is a summary of expenditures on tree-related activities (including planting, pruning, fertilization, pest control, and removal) as allocated in cities of various population sizes. In actual dollars, street trees account for the greatest segment of expenditures. The distribution of activities and expenditures suggests that a complete annual accounting of all programs is necessary to assess both current and historic conditions of urban forestry programs.

**Table 4: Mean Annual Amount Spent on Tree-Related Activities by Population**

<b>Population Size</b>	<b>Park Trees</b>	<b>Street Trees</b>	<b>Public Grounds</b>	<b>Nursery Maintenance*</b>
Over 1,000,000	\$524,461	\$914,534	\$31,768	N/A
500,000 to 1,000,000	\$505,762	\$1,205,616	\$55,834	N/A
250,000 to 499,000	\$303,774	\$1,475,037	\$995,461	\$120,223
100,000 to 249,000	\$72,794	\$459,333	\$129,132	\$12,014

\* 23% of municipalities reporting maintain nurseries for tree management programs

### *Tree Inventory*

A tree inventory can help municipal tree managers identify current and potential problems and plan for budgets, planting requirements and maintenance. Generally, a tree inventory involves collecting data on the number and condition of trees in the urban forest, as well as the urban forest's species composition and maintenance needs. Such information allows managers to plan for planting, prioritize maintenance and establish budgets based on accurate information about the trees in the urban forest.

While an inventory often entails significant start-up costs, it can only be useful if kept up-to-date through continuous data entry. Resources and procedures are needed to do ongoing data entry on the changing conditions of tree species, health and size in locations around a city. Table 5 lists the average one year spending on tree inventories; the larger sum in the 100,000 population category probably reflects inventory start-up in one or more cities

**Table 5: Mean One-Year Amount Spent on Tree Inventories by Population**

<b>Population Size</b>	<b>Mean Amount Spent on Tree Inventories</b>
Over 1,000,000	\$5,987
500,000 to 1,000,000	\$3,687
250,000 to 499,000	\$5,769
100,000 to 249,000	\$21,889

#### *Tree Management Personnel and Administration*

For trees to remain an asset to communities, they must be in good health, which requires regular maintenance and care. Municipal tree management programs carry much of the responsibility of ensuring the health of the urban forest in the United States. Adequate urban forest maintenance requires a skilled work force and appropriate equipment. Table 6 displays expenditures for employee education for both technical and safety practices.

**Table 6: Extent and Fiscal Support of Employee Programs by City Population**

<b>Population Size</b>	<b>% of Cities Providing Training for Employees</b>	<b>Mean \$\$ Spent on Employee Education</b>	<b>% of Cities With Safety-Related Programs</b>	<b>Mean \$\$ Spent on Safety Related Programs</b>
Over 1,000,000	83.3%	\$2,166	66.7%	\$4,228
500,000 to 1,000,000	92.3%	\$4,376	69.2%	\$10,315
250,000 to 499,000	77.8%	\$4,479	72.2%	\$6,354
100,000 to 249,000	75.9%	\$3,898	69.1%	\$3,344

#### *Community Education & Outreach*

Citizen support is vital to an effective tree management program. For example, if citizens appreciate and understand trees, they will help support urban forestry causes and issues and promote the urban forest's health into the future. Also, volunteers can help absorb some of the labor and costs associated with tree planting and maintenance. However, municipal tree managers should carefully plan such volunteer programs so that they don't become more costly than beneficial. Finally, urban forest best practices, such as right tree, right place plant choices, and tree protection procedures during development and construction are the individual actions that collectively improve urban forest health. Education and outreach are ways that forest administrators can share relevant information with the public.

Table 7 is a profile of the education spending done by cities. Also, all U.S. cities spend an average of 2.4% of their annual budgets on citizen education. The study authors noted that

municipalities in the Pacific Northwest spend the highest average percentage of their tree management budgets on taxpayer education (8.6%) compared to cities of other U.S. regions.

**Table 7: Amount Spent Annually Educating Taxpayers About the Urban Forest by Population**

<b>Population Size</b>	<b>Mean Amount Spent Educating Taxpayers</b>	<b>Mean Amount Spent Per Capita</b>
Over 1,000,000	N/A	N/A
500,000 to 1,000,000	\$78,938	\$0.09
250,000 to 499,000	\$13,495	\$0.03
100,000 to 249,000	\$19,119	\$0.09

### *Municipal Urban Forest Policy*

Tree-related ordinances can provide a basis for tree management and help protect the community's tree resource. Most municipal forestry ordinances have three primary functions: provide authority, define responsibility and establish minimum standards for management. Such functions help ensure that the community's approach to tree management is consistent. Table 8 reports the content of tree regulations and frequencies of municipalities (of all population sizes) enacting various codes.

**Table 8: Municipal Tree Policies**

<b>Ordinance</b>	<b>% Municipalities With Regulation</b>
Have tree management ordinance	68%
Regulate species planted in public right-of-way	54%
Require developers to plant subdivisions	39%
Require replacement of removed trees on private or public property	34%
Regulate planting configurations on private or public property	34%
Regulate removal of dead or diseased trees on private property	32%
Define tree maintenance responsibilities on private property	23%
Other	16%
Regulate species on private properties	15%
Identify formula for monetary value	13%

### *Challenges Facing Municipal Tree Programs*

Survey questions were designed to determine municipal managers' beliefs and priorities regarding the urban forest. One question asked urban forest administrators to consider budget - if budget were increased by 10%, how would they spend it? Respondents focused on four primary areas of need: maintenance/care, adding staff, planting and education. If given a 200% budget

increase most would use the funds for maintenance, for tree planting, to maintain/improve existing programs, to educate the public, to conduct a tree inventory and to implement a scheduled tree maintenance/ removal program. While many municipalities are aware of the importance of a systematic maintenance program, a high percentage of tree management activities are performed on an as-needed basis.

These responses align with the perceived challenges facing program managers in their respective cities. Reported top challenges for both 5 and 10 year periods following the survey were similar. Public support, funding - including general funding and funding for maintenance and planting - lack of knowledge/education and diminishing forests topped lists for both periods.

Proper maintenance of trees without adequate funds is a challenge that many municipalities face. The study considered the value of using a tree inventory in a maintenance program. Conducting a tree inventory and using inventory data to prioritize maintenance and establish a systematic maintenance program may actually reduce costs. Systematic maintenance can lead to healthier trees that require less expensive follow-up maintenance than unhealthy, hazardous trees. Also, a carefully planned systematic program is more efficient because trees in the same street, block and maintenance area requiring similar maintenance can be worked on at the same time.

**Table 9: Comparison of Forestry Operations for Cities over 100,000 population**

City	Population of City	Number of Street Trees	Annual Forestry Budget	Annual Expenditure per Capita	Annual Expenditure per Tree	Tree Inventory	Pruning Cycle in Years
Milwaukee, Wisconsin	620,000	200,000	10,000,000	15.13	50.00	Yes	4.5
Modesto, California	150,000	85,000	1,790,000	11.93	21.06	Yes-GIS	3
Ann Arbor, Michigan	107,000	38,000	1,014,000	9.47	26.68	Yes-GIS	9
<b>Seattle, Washington</b>	540,000	130,000	3,600,000	4.25 <sup>12</sup> / 6.60	27.69	partial	19
Lexington, Kentucky	260,000	80,000	1,600,000	6.15	20.00	Partial	5
Lansing, Michigan	130,000	40,000	765,000	5.88	19.13	Yes	10
Chicago, Illinois	2,780,000	440,900	14,800,000	5.32	33.56	Partial	6
Wichita, Kansas	280,000	76,000	1,400,000	5.00	18.42	Yes	12
Toledo, Ohio	380,000	104,000	1,770,000	4.66	17.01	Yes-GIS	7
Cleveland, Ohio	500,000	108,000	2,300,000	4.60	21.30	Yes-GIS	5
Kansas City, Missouri	438,000	452,000	1,958,307	4.47	4.72	Partial-GIS	40
San Jose, California	730,000	250,000	1,670,000	2.29	6.68	Yes-GIS	10
Houston, Texas	1,800,000	700,000	3,000,000	1.67	4.29	Partial	16
Huntsville, Alabama	164,000	22,300	185,000	1.13	8.30	Partial	3

**Cities are ranked according to the Annual Expenditure per Capita.**

<sup>12</sup> Calculation not including expenditure on powerline clearance.



## **E. Municipal Program Comparisons - 2000 Data**

In 2000 the City of Kansas City, Missouri conducted an informal survey of U.S. cities of population greater than 100,000 to learn more about current urban forestry operations. Data was initially gathered from city web sites, then supplemented by telephone interviews of urban forestry managers. Table 9 is a summary chart of funding and forest management data. The information provides a glimpse of the range in levels of resources that cities are committing to urban forestry. For instance, per capita tree expenditures ranged from \$1.13 to \$15.13, and annual expenditures per tree ranged from \$4.29 to \$50.00. An interesting aspect is the absence of a correlation between expenditure levels and tree pruning cycles; no data was provided by which to investigate whether other program priorities impacted pruning frequencies.

## **F. Municipal Program Comparisons - Neighboring and Peer Cities**

As individuals we often glance at others who we consider to be our peers to do a self-evaluation. What have we achieved? How does that compare with how others are doing?

A similar "snapshot" approach was taken to learn more about like-sized cities that are geographically near Seattle or share similar characteristics. The cities selected for this informal survey are Portland OR, Vancouver B.C., Minneapolis, San Francisco, Boston and Milwaukee.

An informal approach was taken to gather information about the target city's urban forestry programs. Information was first gleaned from cities' web sites. Pages were explored to learn about the general character and highlights of urban forestry activities. This format reveals much about what each program feels is important to share with the general public. Then, follow-up phone calls with urban forestry managers were made to confirm web page information and fill in information gaps.

The following sections contain first, summary interpretations derived from the entire data set, and then, a short profile for each city that highlights noteworthy or innovative urban forestry policy or practices.

### *Summary - Funding Support*

Information was first collated to compare peer cities with the data of Section E of this report. Table 10 contains the summary information. Seattle falls in the middle of the range of per capita expenditures for peer cities, and more than the average for cities with populations greater than 100,000 (Table 2). Despite the funding support, Seattle's pruning cycle is much longer than other cities and this undoubtedly impacts urban forest health in Seattle. Ongoing maintenance is needed to reduce hazard to citizens and property, while optimizing the benefits of the City's green infrastructure.

### *Summary - Program Characteristics and Trends*

Table 11 contains the collected available information about each city's programs.<sup>13</sup>

Urban Forest Program Administration - Several patterns and trends became apparent as the data from six selected cities was assembled. The first has to do with the department or agency

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<sup>13</sup> Should not be considered an exhaustive listing due to time and resource limitations for data collection.

primarily responsible for administering urban forestry programs. Urban forest programs are generally distributed between parks departments and public works or streets departments. Successful programs have (or are in the process of) consolidating most urban forestry work within one department. While early affiliations of tree programs were in public works, reflecting a city beautification approach, contemporary parks departments have both public service and ecological missions that align more closely with the emerging objectives of urban forestry. Consolidation of programs can offer

**Table 10: Comparison of Forestry Operations for Neighboring and Peer Cities**

City	Population of City	Number of Street Trees	Annual Forestry Budget	Annual Expenditure per Capita	Annual Expenditure per Tree	Tree Inventory	Pruning Cycle in Years
Minneapolis, Minnesota	361,000	175,000	6,750,000	18.70	38.57	no	6
Milwaukee, Wisconsin	620,000	200,000	10,000,000	15.13	50.00	Yes	4.5
Seattle, Washington	540,000	130,000	3,600,000	425 <sup>14</sup> / 6.60	27.69	partial	19
Vancouver, B.C.	500,000	118,000	2,730,000 (U.S.)	5.46	23.14	yes	7 1-2 commercial
Portland, Oregon	550,000	200,000?	1,400,000	2.55	7.00	partial	7
Boston, Massachusetts	575,000	40-50,000?	1,300,000	2.26	26.00	partial	none
San Francisco, California	799,000	100,000?	???			partial	????

**Cities are ranked according to the Annual Expenditure per Capita.**

opportunities to enhance planning, budgeting, and staffing, while developing a core program that has greater public visibility. Trees tend to be invisible in people's everyday lives; services dispersed among many crews and happening in many places run the risk of not earning voter attention or support.

Role of Neighborhoods - Neighborhood planning is becoming an important partner of urban forestry programs in the selected cities. At the least, most managers reported working with neighborhood associations expressing an interest in tree planting. In others, such as Minneapolis, neighborhoods are becoming the locus of urban forest planning and implementation. Neighborhood involvement strategies differ. Some UF programs respond to green elements presented in neighborhood comprehensive plans. Most offer grant and technical resources to neighborhoods that wish to initiate a tree program. Minneapolis provides five-year grants to neighborhoods - providing tree grants for year one and four subsequent years of

<sup>14</sup> Calculation not including expenditure on powerline clearance.

maintenance support. Vancouver, B.C. conducts its pruning cycle by designated neighborhood clusters, concentrating the effectiveness and visibility of its field work. Boston is working with neighborhoods on a whole host of improvements, including trees, to create "charm bracelets" to augment its renowned "Emerald Necklace." Urban forestry has traditionally relied on citizens to support and implement local programs. The emergence of neighborhood planning is associated, in many cities, with neighborhood based urban forestry programs.

Citizen Advisory Committees - Most cities surveyed have a citizen advisory group of some sort. These groups are diverse in character and activity. Some tree commissions are dedicated solely to urban forestry issues; others are subcommittees of larger urban environment commissions that make recommendations about trees within an expanded scheme of city green. Some advisory group members are appointed, others volunteer. Some groups meet independently and report back to city government; in others citizens are involved in decision-making meetings and processes that interface directly with many city staff. In many instances committee members are active partners in funding development and recruitment of corporate, foundation or NGO supporters. They also play a very public role in communications of the importance of urban forestry to citizens and community.

Vision and Visibility - Tree programs constantly run the risk of budget cuts as other programs are perceived to be of greater importance or priority. Ongoing communications about the multiple benefits of the urban forest to the city and its citizens are essential. Successful programs also effectively communicate about the necessary materials and staff for a sustainable forest. Cities do this in two ways. First, some launch campaigns that capture the attention of the general public and recruit partners for political and fiscal support. An example is Vancouver's Tree Trust, launched in 1998. In addition, successful programs prepare reports for internal communications that describe budget status, outline management goals and objectives and describe the status of major activities. Such documents highlight achievements and the merits of urban forestry, providing frequent updates to decision-makers.

### *Individual City Highlights*

Portland, OR - This city has an 11 member Urban Forestry Commission. It also works closely with partners such as Plant Amnesty, Portland State University and Schmitt's Nursery. Its management plan, adopted in 1995, is now being revised to include endangered species recommendations. The Tree Liaison program trains volunteers to become neighborhood tree stewards. Recently, the City Forester position was reclassified as the Urban Forest Manager.

Vancouver, B.C. - Program innovations include public campaigns to build support. "Tree Care" is the public relations version of the city's street management program. Also, the Tree Trust was launched in 1998 to diversify funding by partnering with NGOs, providing informational materials to the public, and encouraging citizen tree planting using vouchers. Additional outreach efforts are a Neighborhood Trees for You program, Arbor Month activities and an annual Tree Fair.

Seattle, WA - Many opportunities are available to individual citizens and neighborhoods wishing to plant trees. Technical information about tree selection and planting are available in publications and on the web. Tree Stewards is a nationally recognized volunteer training

program. Since numerous agencies conduct tree activities, the Urban Forest Coalition strives to coordinate programs.

San Francisco, CA - Information gathering for this city was incomplete. Urban forestry activities are distributed among Public Works, Parks, and Environmental Services. Access to information and services is not straightforward, requiring multiple calls and contacts. A *Park Renaissance* initiative and bond issue has enlisted partners and public support to restore the city's in response to increasing user pressure and decades of neglect.

Minneapolis, MN - The Park and Recreation Board adopted street trees management from Public Works, swapping parks utilities jurisdiction. This consolidation brings all municipal urban forest activities under one roof. The Committee on Urban Environment is a 29 member citizen advisory committee (having an urban forest subcommittee) that actively contributes to urban resources policy. A 20 year Neighborhood Revitalization Program includes tree activities. For instance, tree grants are awarded for a five year period, the first for tree planting and the subsequent four for tree maintenance.

Boston, MA - Boston has a fairly low tree count and small urban forestry staff for a city of its size, reflecting a focus on management of its public cultural and historic resources. Yet citizen demand for more trees, especially in neighborhoods, was expressed during community workshops held to develop Boston 400. Commemorating four centuries of city history, the comprehensive plan lays out a vision for city functions and improvements. Neighborhoods are the focus of projected green activities - such as creating gateways and "charm bracelets."

Milwaukee, WI - Milwaukee has one of the premier urban forestry programs in North America. Well funded and well staffed, the Division of Urban Forestry manages over 200,000 street trees and 121 miles of boulevards. Many of the city's management practices have become national standards. For instance, the pruning cycle is three years for small trees and six years for trees greater than 12" DBH. In addition, the city partners with the University of Wisconsin to conduct research on tree health issues and maintenance performance.

Table 11: Comparison Information Re: Urban Forestry Programs for Seattle's Neighboring and "Peer" Cities

	Location		Demographics		Vegetation Resource		Management Framework					
	City	Department	Population	Area	Street Trees	Open Space	Funding	Mgmt Plan	Inventory	Maintenance Cycle(s)	UF Best Practices	Staff
Seattle	Seattle, WA	SeaTrans, Seattle Parks	540,000 1998	84 sq miles	130,000	6,200 acres of parkland, 400 parks and open spaces	\$3.6 M across multiple depts; \$198 M fall 2000 vote on parks/open space levy	Master Street Tree Plan (Phases I, II, III)	partial	19 years?	Street Tree Planting, Species Selection, Planting Guidelines	20 - 3.5 arborist/UF, 4 arboriculturists, 1 Land Arch, 2.5 program coordinators, 8.5 tree crew, .5 clerical/admin
	Portland, OR	Parks & Rec	550,000	89,600 acres	no current count (69,500 street trees in 1976 plus 130,000 planted since		\$1.4 M, considering frontage assessment for funds	1995 Urban Forest Management Plan, now updating with endangered	no - desire GIS and canopy estimate	7 years but interrupted by request response	not available	23 - Urban Forest Manager, data collection coordinator, clerical, field supervisor, 7 tree inspectors, 4*3 crews
Geographic Neighbors	Vancouver, BC	Vancouver Parks Board Arboriculture Section, Planning Dept Tree & Landscape Group	500,00		118,000 street trees on 800 miles of streets (estimated to be at 60% of streets capacity), no parks - no pt vot	1300 hectares of parkland, Greenways program (launched 1995)	\$3.1 M street trees operations budget + \$1.1 M for capital improvements tree planting (Canadian program)	adopted 1990, "Treecare" street tree mgmt program is public communication	street trees database (Tree Manager), N/A for parks, planned use of city GIS	7 year pruning cycle by neighborhood (22) clusters, 1-2 year cycle in biz/commercial	Tree Protection, Root Protection, Utility Line, Species Selection, Tree Stewardship (conservation/transplant)	50 full time - 5 tech assistance and admin (Arb, data, IPM), 1 field foreman, 2 inspectors (2 city sections), 11 truck crews (4 pruning/chippers)
	San Francisco, CA (city & county)	Recreation & Parks Dept, Dept of Public Works (Bureaus of Streets, Environmental Services, Water)	799,000		100,000 (Friends of UF count), city maintains 25-30K public trees	goal of \$400 million public/private funds to restore parks	\$1.5 M no general funds so funding beyond 2000 uncertain, sales & gas tax revenues will soon lapse, utility pruning by PG&E	1979, 1991 policy statements- Trees for San Francisco	partial, Golden Gate Park, Parks & Squares	7 years (for 25-30K public trees)	little documented, IPM Ordinance, Planting Standards and Specs, Recommended Species	19 in DPW (1 admin, 1 clerical, 5 removal/planting, 12 tree crew); 22 in parks (1 admin, 10 planting in GGP, 6 P&S, 5 arborist crew)
Peer Cities	Minneapolis, MN	Minneapolis Park and Recreation Board (2000 took on street trees from Forestry Section of Dept. of Public Works)	361,000 - 1998 estimate	64 square miles	175,000 on 1,100 miles of streets (7000 tree loss in 1998 storm)	5,986 acres of parks in 1990	\$6.75 M	yes, integrated with policy manual	no - will be part of full city GIS now being planned	6 years	tree trimming and removal, insect and disease, emergency and storm management	Program Manager, Community Coordinator, 100 (5 admin, support 20, 75 field including 1 supt, 6 foremen, 14 crew leaders, operating 7 towers & chippers)
	Boston, MA	Parks & Recreation	575,000		40-50,000 street trees, no parks estimate	2,200 acres of park land	\$1.3 M for tree planting	adopted internal policy document in 1993, 1997 Environmental Blueprint (focus on air and	no archives, have been doing volunteer inventories in neighborhoods	none	1993 policy includes Tree Valuation, Planting Specifications, Tree Work Specs,	9 - Tree Warden/ Urban Forester, Planting Project Manager & Asst, 6 field crew
	Milwaukee, WI	Dept of Public Works Division of Forestry	621,000	96 sq miles	200,000 street trees, 121 miles of landscaped boulevards	476 acres of boulevards & green space	\$10 M	Comprehensive Boulevard Plan	yes	3 year for <12" DBH, 6 year for >12" DBH, rotation by quarter sections	Planting Specifications, Insect and Disease Control, Preventing Construction Damage, Emergency Storm Response, Tree Operations	200 full time and 50 seasonal, 28 mgmt/admin (Forester, Inspectors, Technical Services, Coordinators), 6 field supervisors, 157 crew staff, 8 plant nursery, equip (12 bucket trucks, 13 chippers)

Table 11 (continued): Comparison Information Re: Urban Forestry Programs for Seattle's Neighboring and "Peer" Cities

	Management Framework (continued)			Community Framework						Contact Info.	
	City Admin Structure	Policy	Regulations/ Incentives	Vision or Campaign	UF/Tree Commission	Partners	Neighborhoods	Citizens	Public Contact	Web Site	Phone
Seattle	City Arborist, Urban Forest Coalition of departments	Forward Thrust program of 1970s, Heritage Tree Program, Olmsted legacy, no commitment to maintenance, permits to qualify arborists	Maintenance of Trees per Street Use Code, Street Tree Permits, Tree Removal Permits; Woods Legacy Project Tree Certificates	Millennial Tree Project	none	Plant Amnesty, ReTree Ballard, TreeMendous?	Department of Neighborhoods Tree Fund, Traffic Circle Plantings, community tree project guidelines	Tree Stewards, regional volunteer coordinators, Parks volunteers, Adopt-A-Park program, Web directory for UF to help	City Arborist, "A City Among the Trees" publication, web site	<a href="http://www.ci.seattle.wa.us/td/arb/orist.asp">http://www.ci.seattle.wa.us/td/arb/orist.asp</a>	Nolan Rundquist (City Arborist), 206-615-0957
Portland	City Forester (UF Manager), coalition of bureaus and utilities, Bureau of Envir. Services	Heritage Tree program, 1994 Sustainable City Principles, Tree Protection, Planting and Care Guidelines, developing construction	Public ROW Tree Protection, Landscape Ordinance, Parking Landscape, Land Use Buffering, Environmental ZonesTree Cutting		11 member Urban Forestry Commission	Friends of Trees, Plant Amnesty, Portland State University, PG&E, Schmitt's Nursery	community and neighborhood Plans	Friends of Parks, provide tree walks, Tree Liaison volunteers for training and neighborhood tree stewardship	UF Manager, public information brochures	<a href="http://www.parks.ci.portland.or.us/Services/UrbanForestry.htm">www.parks.ci.portland.or.us/Services/UrbanForestry.htm</a>	Brian McNerny (UF Manager), Rob Crouch (UF Coordinator), 503-823-4489
Vancouver	Arb Supervisor, engineering consults, planning consults	management plan, annual tree planting based on inventory analysis, Development Site Review, Parks & Rec Annual Report, misc program reports	1994 Private Property Tree Bylaw (regulating tree removal and replacement), Tree Removal Permits, Tree Vouchers, Tree Trust contribution awards	Tree Trust launched 1998	no direct tree advisory group, Park and Recreation Board, Tree Trust Sponsor Comm.	business associations, neighborhood associations, BC Hydro, Tree Trust members	70% stock level is goal-some at nearly 100%, Arbor Month activities, Neighborhood Trees for You program	Tree Trust includes info materials, individual tree requests, Tree Voucher	Hot Line, annual Tree Fair, web site, Tree Walks, Private Property Tree Line	<a href="http://www.city.vancouver.bc.ca/commsvcs/planning/treebylaw/trust.htm">www.city.vancouver.bc.ca/commsvcs/planning/treebylaw/trust.htm</a>	Paul Montpelier (Supervisor of Arboriculture), 604-257-8580
San Francisco	Urban Forester, Friends of the Urban Forest and city reps joint council	1991 Trees for San Francisco, Tree Ordinance (removal, planting, maintenance, public involvement), need policy for views, need policy for hazard trees - a life from nine	Planting Permits, New Construction and Planting Permits, Tree Removal Permits; FUF does recognition awards	Park Renaissance 1999 initiative and bond issue passed	DPW Tree Advisory Board, Parks & Open Space Citizen Advisory Comm (tree subcomm)	\$1.5 M contracts to Friends of the Urban Forest (non profit) & Tree Corps (jail mainstreaming), building partnerships for Parks	neighborhood plantings by FUF, no city programs, "Friends Of" parks groups (250 neighborhood parks)	Volunteer coordinator, parks habitat restoration, planting guide, pruning brochure, participate in multi-agency "Quality of Life" meetings	tree services hot lines, annual Day at the Zoo field fair and demonstrations, parks PR coordinators		Dan McKenna (acting Urban Forester with parks) 415-831-2745; Paul Sacamano in DPW, 415-554-6700
Minneapolis	Elected Park Board, Environmental Coordinating Team - 1994 multi city agency	The Minneapolis Plan-Natural Ecology Chapter, Parks Board with 6 elements of planning and mgmt including forestry and horticulture, UF Policy and Procedures Manual, extensive staff training	Tree Planting Permits, Dutch Elm Disease, Hazard Tree review, Division of Regulatory Services, CUE does annual awards including tree/Arbor Day projects	part of major urban renewal projects in selected zones	Committee on Urban Environment, 29 member citizen advisory comm. with task subcomms	People for Parks citizen group, neighborhood organizations, U of Minn research collaborations	81 neighborhoods-focus of tree planning and planting, Neighborhood Revitalization Program (\$20M each 20 years),	volunteer coordinator, developing info web site, inventory assistance, tree planting, school planting, youth groups	People for Parks citizen group, Arbor Day hotline, Park Board Public Information Coordinator		Jim Herman (Program Mgr) 612-661-4800, Paul Domholt (Community Coord.) 612-313-7732
Boston	Tree Warden, DPW and Property Mgmt Dept. consults, In-House Tree Advisory Committee	1993 internal operations plan, 1999 Boston 400 identifies need for street tree plan and maintenance, 1997 Open Space Initiatives	umbrella state street tree protection measures, no city code	Boston 400, one outcome of 1996 public forum on open	initiated 1993 but only meets 1-2 times per year	neighborhood groups, Boston Green Space Alliance, USFS NE Center for Urban & Community Forestry, URP	centers of urban planning efforts (urban villages, gateways, charm bracelets)	volunteer inventories	Arbor Week celebrations, school plantings		Mark Welch (Assistant Project Manager) 617-635-4505
Milwaukee	City Forester, 3 District Managers	extensive employee training, productivity standards, system-wide operating procedures	Mayor's Landscape Awards	quality of life campaign, part of Milwaukee Downtown Plan	not available	Greening Milwaukee, U of WI-Stevens Point, WI Arborists Association	project focus of Greening Milwaukee	technical info. services, free mulch	City Forester, N/Central/S District Managers, Arbor Day programs	<a href="http://www.forestry.mpw.net/">www.forestry.mpw.net/</a>	Preston Cole (City Forester), 414-286-3595